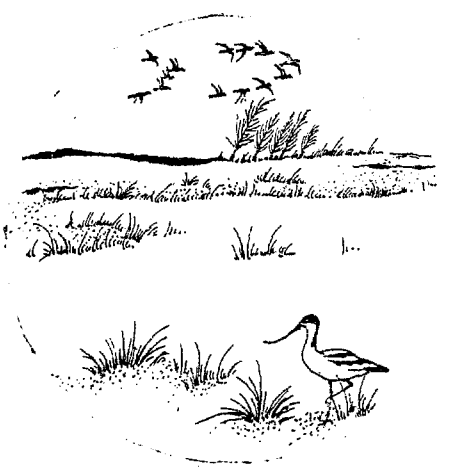
COASTAL ZONE MANAGEMENT



COASTAL ZONE MANAGEMENT

A series of papers presented
as part of a seminar course on
Coastal Zone Management in the
Department of Natural Resources
New York State College of
Agriculture and Life Sciences
in 1977

conducted by
Lawrence S. Hamilton and Peter R. Burbridge

New York State College of Agriculture and Life Sciences
Cornell University
Ithaca, N. Y. 14853
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Preface

This publication represents another collection of papers by graduate students in a regularly offered multidisciplinary seminar entitled "Natural Resource Analysis for Ecologically Based Planning". Gratitude is expressed to those students, faculty and guests who contributed to the success of this course. The course outline which indicates some of the guest participants is included for informational purposes. Particular thanks are extended to those who have consented to have their papers published.

Gratitude is expressed to the New York State Sea Grant Institute and the Cornell Center for Environmental Research for their financial support of the seminar and to the New York State Sea Grant Advisory Program for assistance in the publication of the seminar papers.

The papers are presented as given by the authors, and only minor editorial adjustments have been made. The authors need not secure permission from the College to publish elsewhere all or a portion of their material. In publishing this collection of papers, the College of Agriculture and Life Sciences does not imply any endorsement of the particular viewpoint or recommendations of any of the authors.

Finally, I would personally like to thank graduate student Peter R. Burbridge who was seminar co-director and who is directing his academic program and his career to some aspect of coastal zone management.

Lawrence S. Hamilton
Professor of Natural Resources
Seminar Director

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Seminar on Coastal Zone Management
NR 602
2:15 P.M. Fernow Seminar Room

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February 2.	Physical processes of the coast. Geomorphology and man's intervention in these processes. - Prof. Arthur Bloom Dept. of Geological Sciences - Cornell
February 9.	A biologist looks at coastal zone problems. - Prof. John Kingsbury Shoals Marine Lab. - Cornell
February 16.	The process of management of the coastal zone. Legal and institutional framework. C.Z.M. Act of 1972 and state initiatives. - Richard Gardner Acting Associate Director for Policy and Program Development Office of C.Z.M., N.O.A.A.
February 23.	Major pressures and substantive issues in the coastal zone. - Mr. P. R. Burbridge - Prof. L. S. Hamilton
March 2.	The ecological basis for coastal zone management. - John Clark The Conservation Foundation
March 7/8.	Public Seaports and coastal zone management. - Prof. Marc Hershman, Director Institute for Marine Studies

Professor Hershman will be visiting Cornell on the 7th and 8th of March and we hope to arrange a seminar during the late afternoon of the 8th 4:00 onwards to allow as many as possible of the seminar participants to attend.

March 9.	Zoning: a rational approach to coastal zone management and rehabilitation. - Dr. J. R. Schubel, Director Marine Science Research Center Stonybrook
March 16.	The approach of one state - Rhode Island. - Mr. John Lyons, Chairman R. I. Coastal Resources Management Council
March 23.	New York's approach to C.Z.M. - Prof. B. T. Wilkins Sea Grant Advisory Service - Cornell - Brian Doyle Marine Extension Specialist Brockport
March 30.	Problems and solutions(?) in the San Francisco Bay Area. - Deborah Hoard Formerly Bay Area Conservation Commission.
	California coastal management - Volunteer
April 13.	Scotland and oil. Perspectives on British coastal planning. - P. R. Burbridge
April 20 & 27.	Issues yet to be resolved (home rule vs. state vs. region vs. U.S.; public participation; national guidelines: international problems; statewide planning vs. coastal planning; watershed - how far upstream from coast? - Students
May 4.	What lies ahead for coastal resources management. The state of the art and our recommendations for improving C.Z.M. - Free for all

Sponsored by Cornell Center for Environmental Research and the New York State Sea Grant Institute.

Seminar Directors
P. R. Burbridge; L. S. Hamilton

Introduction and Overview

Peter Burbridge

The term Coastal Zone is used to define the area in which terrestrial and aquatic ecosystems interact to create an area of great biological productivity. This zone is also an area of great resource stress that is a result of increases in population, technology, demand for energy, marine resource harvesting, wealth, mobility and leisure time. A series of conflicts over the ownership and use and timing of exploitation of the resources of the coastal zone is also occurring. This has led to loss of opportunities for more rational resource development and to unforeseen ecological consequences which have created an increased interest at all levels of government in devising measures for the protection and use of coastal resources.

The international significance of coastal zones is related to the world distribution of primary production which is shown schematically in Figure 1.1. The values represent the average gross production rate per square meter to be expected over an annual cycle. From this illustration it can be seen that the potential biological fertility of certain shallow water systems such as estuaries, coral reefs, and mineral springs together with moist forests, intensive agriculture, and natural communities on alluvial plains may range from 10 to 20 kilocalories per square meter. Production rates higher than 20 have been reported for experimental crops, polluted waters, and limited natural communities, but these values are based upon short-term measurements; values higher than 25 have not been obtained for extensive areas over longer periods of time. (E. P. Odum 1963). When linked to the biological productivity of

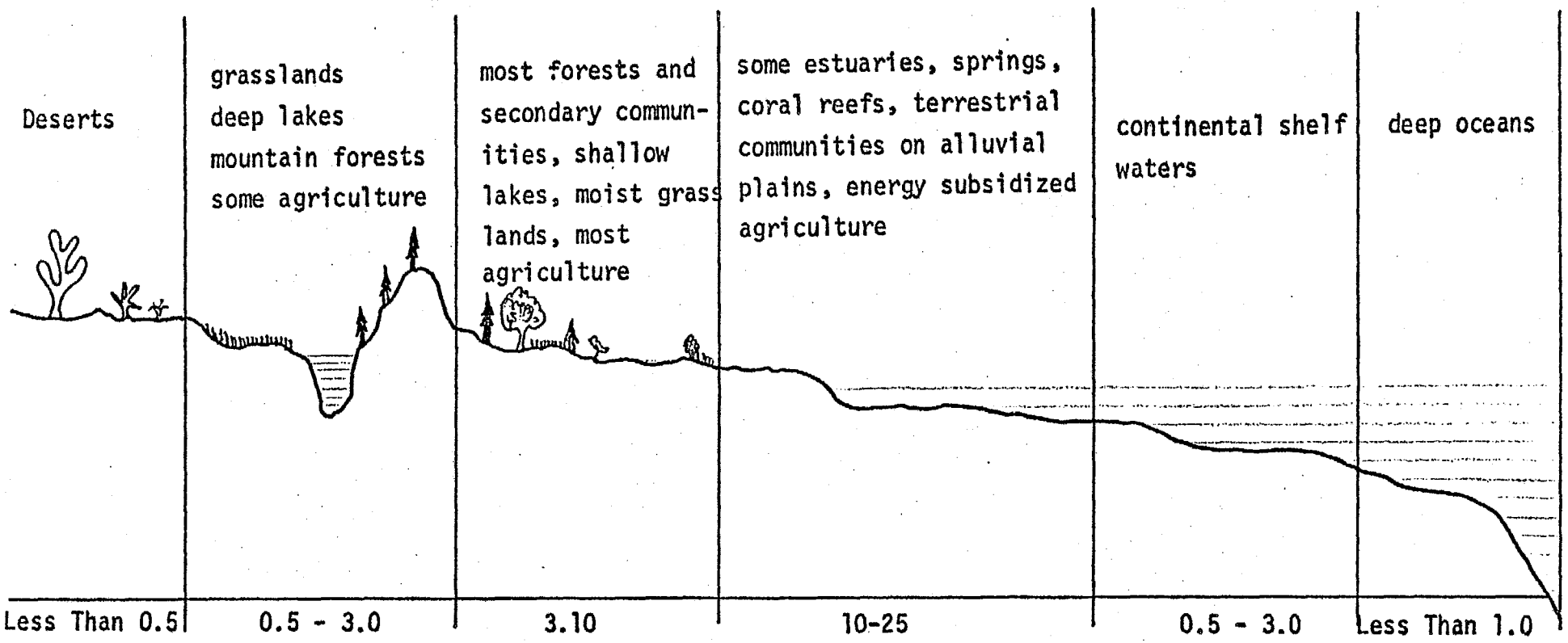

Figure 1.1. The world distribution of primary production in terms of annual gross production (in thousands of kilocalories per square meter) of major ecosystem types.

Adapted from E.P. Odum 1971 "Fundamentals of Ecology" W.B. Saunders Co. Philadelphia

the world's oceans, the terrestrial and aquatic ecosystems of the coastal zone provide the nutrients, nursery areas and spawning grounds for two-thirds of the world's entire fisheries harvest. (U.S. Commission on Marine Science and Resources, 1969).

There can be no correct definition of a coastal zone or any standard management procedure to be applied rigorously to all such zones. A definition suited to an urbanized coastal area - as in Long Island - may be inappropriate for a wild area in the Baja California. In each area the physical nature of the coastal zone is the result of complex and dynamic geological/geomorphological processes. (Steers 1971). The geological structure and subsequent geomorphological processes present in different coastal areas create varied coastal forms including straight shorelines, deep rocky fiords, tidal rivers, or shallow marshy embayments. Each coastal ecosystem operates within the physical confines of these various coastal forms. The characteristics of the land and water elements are related geologically and are fixed by the general shape, size and depth of coastal water bodies. (Clark 1974).

The coastal zone is an area of transition (an ecotone) whose width will depend on the steepness of the environmental gradient involved. Within ecotones there are a greater number of species than in the adjacent communities. They are composed of an intermixture of species which include, on the one hand, the most tolerant members of the neighboring communities and, on the other, edge species peculiar to the ecotone itself. (Tivy 1971). The richness and diversity of plant and animal species in coastal zones is reflected in the diversity of man's activities that seek to make use of those resources. The flux of the ocean, estuarine and land features offers different resources and limitations to their use, and may respond in various ways to different management practices.

A concept of the coastal zone and definition of its limits which did not encompass such diversity would be misleading and could lead to failures in resource management. See (Figure 1.2.)

There are, however, common characteristics of coastal areas and their management problems that are present in all such zones. These include those that directly affect the immediate use of the land and water areas such as dredging of harbours, increased filling of tidal marshlands, pollution from industrial, agricultural and domestic wastes, oil spill effects from seaward siting of power plants, access for recreation, shellfishing management and beach erosion. These activities can affect the biological productivity of the oceans through the degradation of estuarine and shallow water coastal environments. Though the productivity of the deep oceans is small in comparison with lowland agricultural areas, the estuarine and ocean food chains form a major reservoir of protein that will grow in significance with the increase of world population. Conflicts between competing uses and unbridled exploitation of coastal environments will have a direct effect upon food resources and the world community.

There is a need to resolve the conflicts in resource use in coastal areas. A fundamental problem in planning the coastal zone is the discontinuity of jurisdiction at the coast. Issues of access for example are varied, ranging from claims of riparian rights vested in individual land owners to rights of navigation, fishing and claims of the general public to use the tidal zone and beaches for recreation. Discontinuity between dry land and coastal waters and the lands beneath the sea is also a problem. For example the Federal navigation power and the recent expansion of environmental protection of water areas are not accompanied by powers of protection over submerged lands along

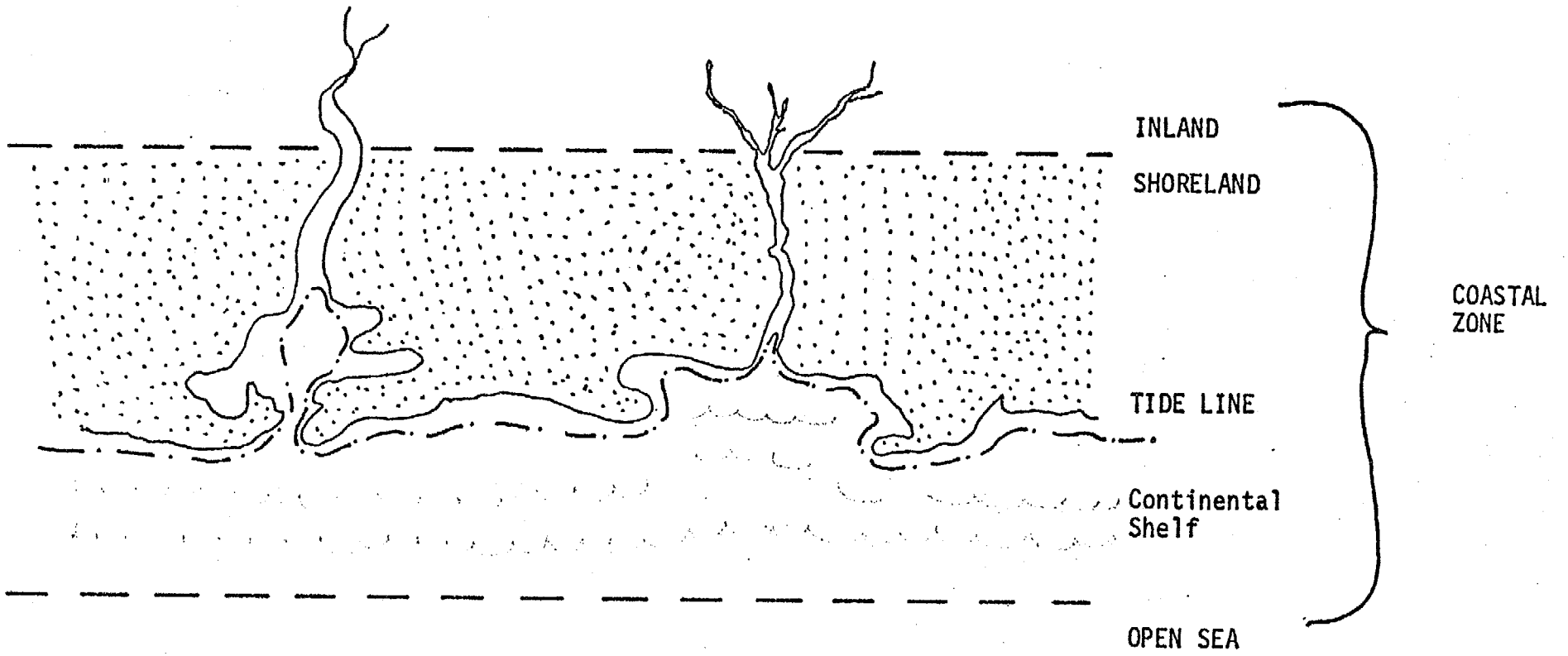

Figure 1.1 Schematic diagram of the coastal zone

the coast. (Ketchum 1972). Within the three mile limit (9 miles Texas and Gulf Coast of Florida) the 1953 Submerged Lands Act (67 Stat. 29) has given the States jurisdiction over the submerged lands and their resources. (See Figure 1.3.)

A critical point that should be considered is that natural systems are involved when the term coastal zone is used and this does not necessarily coincide with the traditionally defined zones such as the three mile limit - originally conceived of as the maximum range of a ship's muzzle loading cannon.

Federal/State Responsibilities.

Consistently throughout the various hearings relating to the development of coastal zone legislation it has been inferred that the States must assume primary responsibility for assuring that the public interest is served in the multiple use of the land and waters of the coastal zone; and that the ultimate success of a coastal zone management program will depend upon the effective cooperation of Federal, State, regional and local authorities.

During the April 1972 Senate Hearings on the National Coastal Zone Management Act (Senate Bill S-3507) it was noted (page 5) (U.S. Senate 1972) that "at present, local governments possess considerable authority in the coastal zone. However, frequently their jurisdiction does not extend far enough to deal fully and effectively with the land and water problems of that zone . . . Until recently local government has exercised most of the State's power to regulate land and water uses. But in the last few years a transition has been taking place, particularly as the States and the people have more clearly recognized the need for better management of the coastal zone." The transition referred to in the hearings is a voluntary shift of powers from local to regional

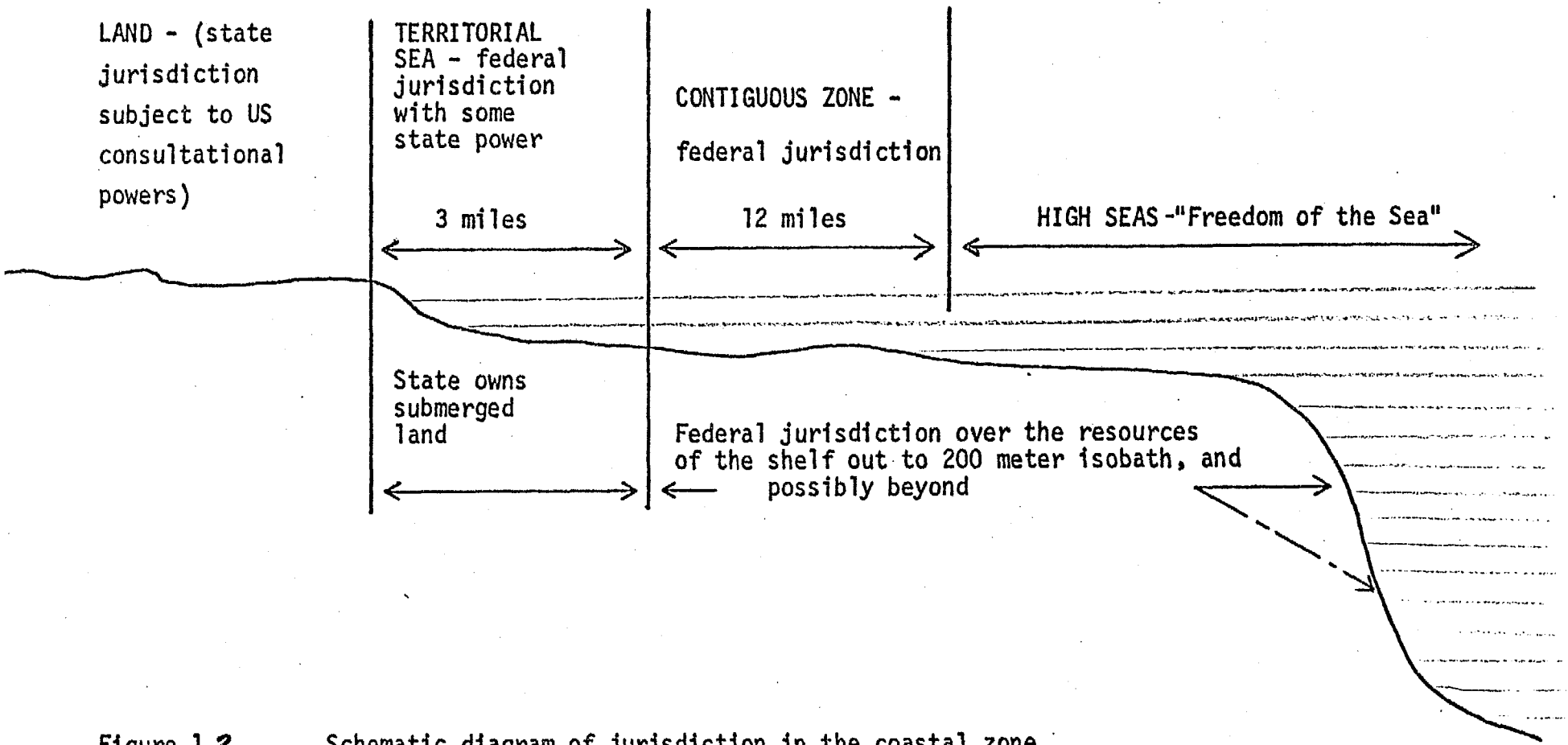

Figure 1.3 Schematic diagram of jurisdiction in the coastal zone

authorities which compliments the wider jurisdictional range needed to deal with the complexities of land use zoning as applied to the coastal zone.

The coordination of Federal bodies dealing with developments in the coastal zone comes in for criticism from the Commission on Marine Science, Engineering, and Resources. Their report "Our Nation and the Sea" in the section on the coastal zone, recommends the strengthening of Federal organization through the formation of a National Oceanic and Atmospheric Agency. It was suggested that this unifying body would be in a stronger position to give assistance to the coastal authorities in achieving a long term management plan. Again in section 3 the key role played by the States is reaffirmed:

"After reviewing the various alternatives the Commission finds that the States must be the fortress of responsibility and action in the coastal zone. The State is the central link joining the many participants." (Commission on Marine Science, Engineering and Resources 1969).

Though the States have been charged with the responsibility of developing coastal management programs there are questions whether traditional land use planning tools will be adequate to solve the problems of the coastal zone. The laws associated with land use are reasonably well developed and techniques such as zoning are related to concepts such as density, plot ratios, building heights, and many other urban related control mechanisms. Though local governments do have such powers and techniques they do not necessarily apply to the rather more complex ecosystem relationships associated with the land and water interface, and they will vary from municipality to municipality. Instead new techniques may have to be adopted and new ways will have to be found to

integrate the expertise of such people as wildlife biologists, fishery scientists and others from relevant disciplines in a planning and management framework. Moreover, coordination among adjacent units of local government must be achieved, or powers will have to be shifted to higher levels. To this evolving framework a way of integrating numerous public agencies such as the Coast Guard, Corps of Engineers, Federal Power Commission, Atomic Energy Commission, and the Environmental Protection Agency, to name a few, and a long list of State, Regional and local bodies all dealing with land and water planning and management, will have to be found. The organizational complexity is such that without a rational conceptual framework it would be impossible to manage the intrinsic resources of the coastal zone in an environmentally meaningful way. This might be assisted by development of management perspectives for objectively viewing processes that create the coastal resource base; and for defining management principles and rules. Such a concept would embody economic and social considerations, but should remain rooted in an understanding of the natural factors and processes involved. Once these are identified and understood, then human demands can be related to what is ecologically feasible. This underscores the notion that resources have biological or physical limitations which, if they are to be considered, will require careful management, and the internalization of related environmental costs. Moreover, limits may have to be imposed requiring reassessment of demand in deference to consequences of overexploitation. This is not to say that environmental determinism is the ruling order of such a framework; instead it is a realization that conservation should not only seek to increase resource supply but should restrain demand where necessary. The carrying capacity concept of ecology has validity if the resource is to be maintained.

The utility of the application of traditional economics to resource questions in the coastal zone has been limited because many of the goods and services provided by coastal resources are "public goods", that is - no one can own or control them; therefore, the application of market principles does not resolve the question of their supply, demand, or use. Many resource complexes are termed "common property" resources, in that an estuary is not owned, and the ownership of tidal wetlands is either fragmented or limited to "dry land" areas which may change with seasonal fluctuations in stream flow. Moreover, many "values" of importance in the coastal zone are intangible or difficult to express in standard market terms. If effective institutional arrangements are to be constructed to deal with coastal zones, attention should be focussed upon improving economic techniques and accounting principles to relate more closely to natural resource properties and processes. Social outlooks on the ownership and control of assets belonging to present and future generations should also be considered. The distribution of the costs and benefits accruing from coastal resource development should be equitably distributed within society and present generations should not attempt to live off the capital represented by the physical functioning of geologic and biologic factors and processes. Instead, the ecosystem functions should be maintained in their best possible condition so that resource options are not foreclosed.

Following the creation of a sound coastal resource management framework should be the formulation of appropriate political responses to the management of resources beyond what is immediately palatable and expedient. Ultimately, the choice between various management alternatives and programs relating to the coastal zone and its role in national and international affairs will be made through political channels. The quality

of the political decisions will rest upon the quality of the information collected, the soundness of the concept in interpreting that information in social cost and benefit terms, and the politician's understanding of the concept and its import to society.

Federal Coastal Zone Management Act of 1972

This act constitutes a Federal program to encourage states to develop a rational coastal zone management program. The Act has two kinds of incentives within it - 1. a financial incentive in the form of a grants program to help set up management programs and 2. if states do take up their responsibility to develop management programs consistent with Federal guidelines, they will gain additional leverage in regard to Federal activities that might affect their coastal zones. This leverage is gained through a requirement which states that Federal actions have to be consistent with an approved State management program. (Knecht, 1973).

Key aspects of the 1972 C.Z.M. Act are: 1. it is voluntary, there is no compulsion (or stick) only "carrots" in the form of the incentives mentioned above, 2. it deals with process and not substance. The Federal requirements deal with the process of creating a management program and defining management considerations that must be addressed but it leaves the States to deal with specific land and water use decisions. 3. it is primarily a coastal management program, and refers only to the shorelands to the extent that the use of the shoreland affects the coastal waters, and 4. it recognizes the importance of both economic development and ecological processes and places an emphasis upon the maintenance and enhancement of the ecological system.

To help states implement the provisions of the Act two sets of Federal guidelines have appeared in the Federal Register on Nov. 29 1973 (vol. 38:229) and on January 9, 1975 (vol. 40:6). The first set of guidelines deals with section 305 of the Act which authorizes grants to states to begin the planning process that will lead to Federally approved management programs. The second set of guidelines describes the process by which the Federal government will receive and approve State management programs. These guidelines discuss the criteria, the steps involved and the kind of Federal review that will draw various agencies into the review process.

The State Role

Under the provisions of the 1972 C.Z.M. Act, states are responsible for developing and administering management programs. States are entering a new field with little or no relevant experience in comparable areas for guidance. The state's concern with the kinds of regulation necessary to manage coastal resources has been limited almost entirely to adopting enabling legislation turning this function over to local governments. (Varin, 1973). The main vehicle for this being the enactment of a version of the Standard Zoning Enabling Act, published by the Department of Commerce in 1921. As a result there is a concern on the part of local governments within states that they have actively engaged in land use planning and control for many years but there is a lack of expertise and experience on the part of the states.

The following papers represent some of the contributions from participants in a seminar on Coastal Zone Management at Cornell University where some of the more thorny issues concerning the management of coastal resources were discussed.

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LEGISLATIVE PERSPECTIVES FOR COASTAL ZONE MANAGEMENT

ENERGY AND THE ENVIRONMENT IN THE COASTAL ZONE: The National Environmental Policy Act and the Coastal Zone Management Act

by

Deborah Hoard

ENERGY AND THE ENVIRONMENT IN THE COASTAL ZONE: The National Environmental Policy Act and the Coastal Zone Management Act

Deborah Hoard

The Federal government has control over the development of coastal energy activities[1] in extensive areas of the coastal zone[2] through land and mineral ownership, regulatory authority, programs for financial aid to states and local governments, and through the federal court system. A major problem faced by state and local governments, private industry, public utilities and citizen groups concerned with the environmental impact of the development of energy activities on the coast, offshore and inland, is the overwhelming conglomeration of federal agencies, programs, offices and bureaus having some jurisdiction over that development. The existence of so many different agencies with so many different responsibilities and "missions" has created a significant stumbling block for enlightened decision making at the federal level.

In a recent U. S. District Court case (County of Suffolk v. Secretary of Interior, _ F. Supp. _ (E.D.N.Y. 1977)) where the adequacy of the environmental impact statement (EIS) on the leasing of federal outer continental shelf (OCS) lands for oil and gas exploration and drilling was successfully challenged, the judge commented on the need for a single coordinating and unifying agency to control the leasing, production and exploration for oil on the outer continental shelf. Judge Weinstein stated:

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1 The term "coastal energy activities" is used here as in the Coastal Zone Management Act (16 U.S.C.A. § 1453(4)), meaning any OCS energy activity or any transfer, conversion, treatment, transportation or storage of oil, natural gas or coal, if the siting, construction or expansion, or operation will have a significant effect on the coastal zone.

2 The term "coastal zone" is used here as defined in the CZMA § 1453(l), meaning coastal waters and adjacent shorelands strongly influenced by each other, extending seaward to outer limit of US territorial sea, and inland only to the extent necessary to control shorelands.

"There is thus, apparently, no effective top level coordination of outer continental shelf management, practices and studies.

The Department of Interior shares cabinet-level responsibility for outer continental shelf activities with the Department of Commerce, The Department of Defense, and the Department of State. Within the highest levels of the executive branch, the Council on Environmental Quality and the Office of Management and Budget have substantial, but effectively uncoordinated, powers and duties.

The Department of Interior alone has fragmented its responsibility for federal management of the offshore oil and gas program among at least nine offices, agencies and bureaus: Geological Survey; Bureau of Land Management; Fish and Wildlife Service; Office of Minerals Policy Development; Assistant Secretary, Fish, Wildlife and Parks; Assistant Secretary, Energy and Minerals; Assistant Secretary, Land and Water Resources; Assistant Secretary, Program Development and Budget; and Solicitor.

Additional involved governmental bodies include the Department of Transportation, United States Coast Guard, Material Transportation Bureau, Federal Aviation Administration, Army Corps of Engineers, Office of Coastal Zone Management, United States Navy, Environmental Protection Agency, Federal Power Commission, Interstate Commerce Commission, and National Oceanic and Atmospheric Administration."

If other types of energy activities besides OCS activities were considered, the list of agencies involved would be far longer.

Out of this morass of federal agencies and programs which concern themselves with energy and the environment emerge two statutory programs of particular importance: (1) the EIS process of the National Environmental Policy Act of 1969 (42 U.S.C.A. 4331 et seq.); (2) the grant-in-aid program of the Coastal Zone Management Act of 1972 (16 U.S.C.A. 1451 et seq.), which applies to all major federal project, programs and permit approvals. NEPA and CZMA are of special importance and are worthy of further discussion here because together, they present an unusual opportunity to combine consideration of natural systems with the socio-economics of energy development in comprehensive management plans for a critical zone, the coastal zone.

The two statutes and their respective programs are quite different, but have inter-relationships which affect their implementation. The following sections will outline the major provisions of each program, present some major problems which remain outside the scope of the statutes, and draw some conclusions about what can be done to effectively control the development of coastal energy activities.

The National Environmental Policy Act (NEPA)

NEPA was passed by Congress, as the name suggests, as a statement of a national policy of concern for the maintenance of a healthy environment. The intent of Congress was to state that all federal agencies had an affirmative responsibility to integrate environmental considerations into their decision making (Liroff, 1976). To that end, the statute requires that agencies prepare detailed statements on their own projects or programs and projects or programs that require their approval, that may have a significant effect on the quality of the human environment (§ 102(2)(c)). The detailed statement required by the statute has developed into the infamous EIS. NEPA § 102(2)(c) requires that the EIS must be a detailed statement on:

"(i) The environmental impact of the proposed action,

(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented,

(iii) Alternatives to the proposed action,

(iv) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and

(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented."

It is interesting that Congress apparently did not anticipate the implications of NEPA for the extensive procedure of the EIS process, or more importantly, for the substantive review of agency actions undertaken by the federal courts in cases challenging consistency with NEPA. As one Congressional staff member who worked on NEPA put it, "If Congress had known what it was doing, it would not have passed the law." (Liroff, 1976).

As it was, however, NEPA was passed without a roll call vote just before the 1969 Christmas recess, and became law on January 1, 1970. Since that time, hundreds of millions of dollars have been spent for the preparation, circulation to the public, and federal approval of hundreds of EISs. Most of the statements have been prepared by the Department of Transportation, the Department of Defense (Army Corps of Engineers) and the Department of Interior (CEQ, 1976), on projects ranging from the dredging of the San Francisco Bar to allow larger oil tankers to enter San Francisco Bay to the Trans-Alaska Pipeline System and oil and gas drilling on the outer continental shelf.

An important type of EIS is the "program" EIS - on federal programs and plans such as the Liquid Metal Fast Breeder Reactor Program of the Energy Research and Development Administration and the Coastal Zone Management Plan for Washington State by the Department of Commerce. Program impact statements can be a valuable tool in anticipating the long-range effects of research and development programs and of comprehensive planning programs.

The Coastal Zone Management Act (CZMA)

Despite an expressed displeasure with it, former President Nixon signed the CZMA in October, 1972 - just before the presidential election. Like NEPA, the CZMA program

got off to a slow start, with Congress initially denying the necessary fiscal support for the program. Soon, however, Congress decided to fund the program it had just created, and eventually all 30 states and 4 territories that are eligible for the program expressed some interest in it.

The CZMA program provides for federal grants and loans to states and local governments for the development and administration of management programs for their coastlines. It is administered by the Office of Coastal Zone Management in the National Oceanic and Atmospheric Administration under the Department of Commerce. The Act neither compels a coastal state to do anything nor invests the states with the powers commensurate with the magnitude and the complexity of the envisioned task (Zile, 1974).

The major incentives for states to participate in the program are: (1) the money for development and administration of a coastal management plan, and (2) the promise of federal compliance with each state's management plan once it is approved by OCZM. The development and adoption of a state management plan is subject to extensive - some say oppressive and impossible - regulation by the OCZM, covering such things as extent of public participation, type of state agency or "network" created to administer the plan and the size of the jurisdiction of the agency and plan. At the present time only one state management plan (Washington State) and one segment of a state management plan (for the San Francisco Bay area) have been approved by OCZM, although many states have received grants for the development of plans.

The Amendments to the CZMA of 1976 created a "coastal energy impact program" (CZMA § 1456(a)) consisting of the provision of "financial assistance to meet the needs of coastal states and local governments in such states resulting from specified activities[1]

[1] Specified activities include coastal energy activities (see page 3, footnote 1) and energy facilities (see page 8, footnote 1).

involving energy development." The assistance includes:

(1) grants to states for

a. retirement of bonds,

b. study, planning and development of

i. public works projects necessary because of OCS energy activity, or

ii. public service facilities such as schools, hospitals and waste treatment works;

c. prevention or reduction of unavoidable loss of valuable environmental or recreational resources from coastal energy activity;

(2) grants to the states for study and planning for economic, social and environmental consequences of siting, construction, expansion or operation of new or expanded energy facilities[1] if the Secretary of Commerce finds that the coastal zone is likely to be significantly affected by the energy activity; and

(3) Loans to states and local governments for new or improved public facilities and services required as a result of coastal energy activity.

The 1976 Amendments also added a new requirement which must be met by all state management plans (CZMA §§ 1454(b)(8)). The new requirement is that all plans must include "a planning process for energy facilities likely to be located in, or which may significantly affect, the coastal zone, including, but not limited to, a process for anticipating and managing the impacts from such facilities."

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[1] "Energy facilities" are defined in CZMA §§ 1453(5) as any equipment or facility which is used primarily for the development, production, conversion, storage, transfer, processing or exploration for any energy resource, or for the manufacture, production or assembly of equipment involved in any of those activities. The term includes, but is not limited to, such things as oil refineries, Liquified Natural Gas facilities, electric generating plants, deepwater ports, nuclear fuel processing facilities, pipelines, and offshore rig assembly plants.

Relationship of NEPA and CZMA

Both NEPA and CZMA are rooted in the same base of environmental concern, and yet each has created a very different procedure for turning that concern into decision making tools. Both statutes begin with findings and policies of broad national concern for the protection and wise management of the nation's natural resources. From these broad policy statements the two statutes proceed in quite different directions for the implementation of the policies. CZMA uses the "carrot" approach, encouraging states to engage in planning for the coast by offering federal money and the promise of federal compliance with state coastal plans. The 1976 Amendments also offer these carrots, but also seem to be an attempt to soften the blow of the impacts on coastal states which must be suffered due to the national policy for the development of OCS oil and gas. NEPA, on the other hand, applies across the board to all major federal actions which may have a significant effect on the quality of the human environment, including the approval of state coastal management plans as well as any other major federal action in the coastal zone. NEPA is not voluntary if a major federal action is involved.

The EIS on the Washington State coastal management plan was prepared and circulated as a document separate from the coastal management plan itself. This meant that, since an EIS must fully describe the proposed action, the EIS had to include a detailed description of the plan - almost a duplicate of the plan itself. According to Richard Gardner of the OCZM, the EIS procedure has been changed to prevent such duplication, by requiring that the EIS be included as an integral part of the management plan. Thus, now only one document - the plan and the EIS on the plan together - needs to be circulated and subjected to public hearings.

No EIS was prepared on the approval of the grant to the San Francisco Bay Conservation and Development Commission for the administration of the San Francisco Bay Plan. It was determined that the relatively small grant ($206,000) for the administration of an existing, ten-year old coastal management plan was not a "major federal action significantly affecting the quality of the human environment" within the meaning of NEPA § 102(2)(C).

Two different views of another aspect of the relationship between NEPA and CZMA are discussed in the previously mentioned District Court case, County of Suffolk v. Secretary of Interior. In that case the Department of Interior defense relied heavily on the contention that the affected coastal states and local governments have been, and will be, able to protect their coastal areas and environment from the adverse effects of an incomplete EIS on OCS activity by developing coastal zone management plans in accordance with the CZMA. The Judge held a different viewpoint on the relationship of the two statutes' requirements, stating:

"The argument that this activity (CZMA planning) is a substitute for the government's responsibility under NEPA is unpersuasive. First, NEPA requires an independent assessment of a variety of facts to determine possible environmental damage. That responsibility cannot be fobbed off to the states under a different program. Second, the extensive work being done on the various state plans will not be completed until 1978 at the earliest. Third, the critical amendments to the CZMA relied on by the defendants were not adopted until after the Final Environmental Statement Sale 40 was published and the Secretary of the Interior made his decision to lease; these amendments could have had no impact on his decisions under NEPA.

Certainly the federal authorities were not required to wait until these CZMA plans were completed, although it might have been desirable to put off a decision until a more rational, fully informed decision could be made. . . Furthermore, evidence of the complexity of the task of achieving state coordinated programs that will meld various local views suggests the critical importance of considering local zoning and planning powers in determining the environmental issues under NEPA.

Evidence, which could have been brought to the Secretary's attention by the NEPA documents, demonstrates that these local governmental powers can and will be utilized

to prevent landing of outer continental shelf oil over wide portions of the coast line, whether that landing is by tanker or by pipeline. Failure to include an evaluation of such local opposition to pipeline or tanker-related onshore facilities necessarily resulted in a failure to gain a full and meaningful perspective on the intrinsic environmental problems related to offshore oil and gas exploration."

Problems

Although NEPA and CZMA present an unprecedented opportunity for large scale comprehensive planning together with long range impact analysis and short term conflict resolution, there are major problems which remain outside the provisions of these statutes. Some of the problems stem from the very narrow, literal interpretation of NEPA by the Supreme Court[1] while others are perhaps intentionally beyond the scope of these laws. The following table(on page 12)lists some of the most important provisions of the statutes and corresponding problems or limitations.

Conclusion

NEPA and CZMA provide for many of the components of the type of management system which is required for realistic, effective and enlightened planning and decision making on the development of energy activities in the coastal zone. One further component which seems to emerge from the following table might be the creation of a single, strong federal coordinating agency dealing specifically with planning for energy activities and with environmental impacts on a nation-wide basis.

This is the sort of solution suggested by Judge Weinstein in County of Suffolk v. Secretary of Interior. Judge Weinstein concluded, however, that despite the theoretical power of his court to require the creation of such an agency for coordination of OCS

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[1] In Aberdeen and Rockfish Railroad Co. v. SCRAP, 5 ELR 20418 (1975) and in Kleppe v. Sierra Club, 6 ELR 20463 (1976).

NEPA	1. Requires full public disclosure of project and impacts.	1. Statements very long, often highly technical - unintelligible to public.
	2. Requires consideration of alternatives to project.	2. No requirement to choose alternative with least impact.
	3. Requires consideration of impacts of project.	3. No requirement to deny permit or abandon project with adverse impacts.
	4. Requires scope of EIS to correspond to scope of project.	4. Large scale, long-range impacts often unquantifiable or unknown.
	5. Applies to any major federal action or project which requires federal approval.	5. Projects requiring no federal funding or approval not subject to statute.
CZMA	1. Provides money to states for planning & administration of coastal zone management plans.	1. No requirement that states participate in program. Enough money for task? Planning uncoordinated among states. No provision of additional powers to states to implement plans.
	2. Provides money to states and local governments for coastal energy impact program.	2. No requirement that states participate in program. Enough money for all facilities needed? Acts to reduce local opposition to onshore impacts of offshore energy activities.
	3. Requires federal compliance with approved state plans.	3. Many states have trouble getting plans approved - only one out of 34 possible plans approved.
	4. Requires planning for whole coastal zone.	4. Energy activity impacts often extend far inland and on high seas.
	5. Requires that states' plans take national interest into account.	5. What is the national interest?

activities, as a practical matter it was not suitable for his court to do so. He stated, "Courts simply lack the resources to effectively supervise the integration and coordination of the variety of federal, state and local agencies and other organizations. Reorganization of the federal bureaucracy is a matter for the President and the Congress not the courts."[1]

Despite the power of the President and the Congress to reorganize the federal bureaucracy, there remain severe limitations on that power to compel state participation in federal programs such as CZMA. For example, the states rights doctrine[2] is still a powerful force at work in determining the extent of federal control over many environmental problems. Perhaps this force was at work in the drafting of the two major pollution control statutes, the Federal Water Pollution Control Act (33 U.S.C. §§ 1251 et seq.) and the Clean Air Act (42 U.S.C. §§ 1857 et seq.). In these two statutes most of the planning and regulatory power is offered to the states, with federal approvals necessary at various stages, and with a provision that the federal government must take over if a state fails to plan and regulate in accordance with the statutes. These pollution laws also give the states new powers to enforce their clean air and clean water plans and standards. This is an important difference between these laws and the CZMA.

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[1] The new Cabinet post for Energy proposed by President Carter would take on only part of the responsibility needed to effectively balance the costs and benefits of energy development with the costs and benefits of energy impacts on the quality of life.

[2] The states rights doctrine is based on the Tenth Amendment to the U. S. Constitution, and holds that all powers not specifically granted to the federal government are reserved to the states. The recent increase in the power of the federal government at the expense of the states has led to a renewed interest in this doctrine.

Aside from the problem of the lack of power of the federal government to compel state participation in federal programs, there is the reality of federal programs being administered by the horrifying conglomeration of federal agencies. The difficulties of dealing with the federal bureaucracy have already been mentioned and are generally well known. The following rules of the game for dealing with federal agencies under NEPA taken from Sax (1973), seem an appropriate conclusion, relevant to all the components of a management system for energy and the environment:

"1. Don't expect hired experts to undermine their employers.

2. Don't expect people to believe legislative declarations of policy. The practical working rule is that what the legislature will find is what the legislature's policy is.

3. Don't expect agencies to abandon their traditional friends.

4. Expect agencies to back up their subordinates and professional colleagues.

5. Expect agencies to go for the least risky option (where risk means chance of failing to perform their mission)."

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CONFLICT RESOLUTION AND INTERGOVERNMENTAL COORDINATION UNDER THE COASTAL ZONE MANAGEMENT ACT

by

Greg Smith

CONFLICT RESOLUTION AND INTERGOVERNMENTAL COORDINATION UNDER THE COASTAL ZONE MANAGEMENT ACT

Greg Smith

The uses of land and water resources in our coastal areas have grown steadily in recent years. The coastal area has proven highly desirable as a site for military, residential, recreational, industrial and commercial development, extraction of minerals, transportation, waste disposal and the harvesting of living marine resources.[1] The resources available to accommodate this growth in demand are limited and have necessarily sponsored conflict among competing uses. Governmental supervision of the competing interests has been limited since such agencies traditionally have responsibility for a specific resource issue. At the federal level no single agency has had a comprehensive overview of resource decisions affecting the coastal areas.[2] At the state level, with the exception of a few states, management of the coastal resources and the competing demands has been left to the traditional sources of government, municipal authorities, with various state agencies handling specific issue areas.[3]

In response to these problems, Congress recognized the inadequacy of state and local efforts in planning and regulating land and water uses of the coastal zone,[4] and enacted the Coastal Zone Management Act of 1972 (CZMA).[5] The purpose of the act is to encourage comprehensive planning and management of the coastal zone by sponsoring states to develop uniform policies, programs and administrative agencies for the coastal zone.[6] Because the success of the CZMA will depend upon the development of techniques for coordinating existing programs and governmental agencies with the coastal management program, this paper explores briefly the problems of coordinating the organizational approach at the federal and state level.

The Coastal Zone Management Act

The CZMA provides funds to the states for the development of a coastal management program. The Act establishes a two-step procedure with which a state must comply in order to qualify for the grants. Section 305 of the Act[7] states the requirements for a grant to initiate development of management programs and Section 306[8] establishes the pre-requisites for administrative grants to assist the states in administering the programs. Pursuant to the Act, the states must develop programs which sponsor increased authority over resource use decisions in the coastal zone.

The programs must be approved by the Office of Coastal Zone Management of the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce.[9] The Secretary of Commerce cannot approve a state program without considering the views of affected federal agencies.[10] If a disagreement arises between a state and a federal agency, the Secretary of Commerce shall act as "mediator". Once the management program is approved, federal agency actions must be consistent with the state's management program.[11] Unless national security compels approval, no license or permit to conduct a new activity in the coastal zone is granted until the state concurs in the certifications or the Secretary of Commerce independently finds consistency with the state program.[12] State or local projects applying for federal assistance must be consistent with the management programs or such assistance will be denied.[13]

Federal-State Coordination

The central issue arising is the extent to which a state can control its coastal resources in the face of federal agency disapproval of a state action. Congress, in drafting the Act, clearly intended that states be the dominant force in determining the uses of the coastal

resources.[14] The Act merely encourages the states to assume planning and regulatory powers over their coastal zones.[15] However, in reality, the act raises a number of inter-governmental problems which, in themselves, may defeat the "simple" objectives of the Act. To understand this assertion, a number of factors should be revisited. First, federal involvement in our coastal zones is quite extensive; secondly, federal agency involvement in the coastal zone is both diffuse and significant to a number of federal agencies;[16] and finally, the coordination provision of CZMA dictates that all federal agencies have significant incentive for involvement in the program approval process. These factors appear to represent that federal agencies will both carefully review proposals and that approval, due the coordination provisions, may not be in the best interest of a given federal agency. This suggests the need for an additional mechanism within the CZMA to resolve state-federal disputes.

Evidence of this conclusion is more apparent with a brief review of the existing and proposed laws whose objectives clearly overlap with the purposes of the CZMA. Thus, the River and Harbor Act of 1899;[17] the Fish and Wildlife Coordination Act;[18] the Flood Disaster Protection Act of 1973;[19] the Rural Development Act of 1972;[20] the Federal Water Pollution Control Act;[21] the Water Resources Act of 1965;[22] the National Environmental Policy Act;[23] the Offshore Deepwater Port Act;[24] the Land-Use Planning Acts;[25] the Shoreline Erosion and Beach Access Programs;[26] and the Power Plant Sitting Act[27] will affect the vitality and success of the CZMA.

Whether there will be coordination between the various federal programs listed above is dependent upon a number of factors. In part, this will depend upon judicial interpretations of the preemption and conflict doctrines of the Supremacy Clause which would come into play when a state law, enacted as part of a coastal management program,

conflicted with a federal law.[28] In part this will also depend upon judicial interpretations that the nonderogation clause of the CZMA does not require the CZMA to yield to prior federal law.[29] Even given a favorable interpretation of the two issues indicated above,[30] there remains the practical problem of achieving coordination between the various state and federal programs.

As outlined above, the Act contains a number of coordinating clauses for solution of interagency conflicts.[31] Section 1456 (a) requires the Secretary to consult, cooperate and coordinate with other interested agencies. Section 1456 (b) prohibits the Secretary from issuing approval of a management program without considering the views of federal agencies affected by the program. Section 1456 (c) requires that federal activities which affect the coastal zone be undertaken with as much consistency to the approved state programs as is practicable. Under the subsections to 1456 (c), federal agencies and their agents, conducting or supporting activities directly affecting the coastal zone, must comply with state programs.

The act places enormous responsibilities upon the Secretary of Commerce. Not only must she "consider" the views of federal agencies in deciding whether to approve a state program, but she must also decide when an activity proposed by a federal agency is consistent with a state program. Both of these are significant powers which may have an important impact on state and federal actions. The Act does not specifiy a procedure, nor does it indicate alternative steps if an entity is unhappy with a secretarial decision or if the Secretary fails to act.

Two commentators have suggested that active bargaining by the Secretary between state and federal agency positions will insure coordination of program effort.[32] This,

if it occurred, would be a good coordinating device, but it would appear from the evidence presented to this seminar by a CZMA official and from the approval of only one state program, that the Secretary has not asserted an active role. Without this influence, federal agency interest is to slow development of programs so that they may continue to operate without the restraint of Section 1456 (c). For this reason, the Act should entail a formal procedure for approval. It is suggested that this also include a more elaborate mediation procedure than placing the decision upon the Secretary of Commerce.

A further problem of coordination is that the Act does not specify a procedure for disputes arising when an applicant has received state approval but has been denied the go ahead by a federal agency.[33] The Act suggests that federal actions should be consistent with those of the state, but fails to provide a mechanism to mandate approval by a federal agency. The Act does not change nor supercede prior law,[34] and thus federal policy could be more restrictive than the state program. This appears untoward in light of the purposes for inclusion of Section 1456 (c). Two commentators have suggested that the manner in which to avoid this problem is to resolve potential conflicts prior to program approval.[35] This appears overly naive in light of the difficulties already apparent in the approval process. Slower progress is suggested if conflict resolution is to depend upon the forcasting of potential difficulties. Again, this argues for a vehicle of mediation of state-federal interest conflicts.

One further problem of intergovernmental cooperation is apparent from the Act. The approval procedure, itself, suggests that the formulation of state programs is likely to be determined by the various federal interests "considered" in the plan formation process. This, of course, is dependent upon the role taken by the Secretary of Commerce. Should the Secretary actively assert state interests then this might not occur. However, if the

role of the Secretary is passive, then to achieve approval the state must compromise with federal agency suggestions. While this should not suggest itself as an inherent evil, it is detrimental if the purpose of the Act is to sponsor state programs. As environmentalists, we may be pleased when a commercially oriented state must form its regulations in agreement with more liberal federal policy. Most likely, such a state will fail to participate. However, we would not be pleased to see a progressive state law on power plant siting bow to the dictates of the Nuclear Power Regulatory Commission. Again, the problem suggests that a further vehicle for mediation is necessary.

What form such a board should take is problematic. Certainly a formal procedure should be set up. Certainly also, the procedure should entail more of a neutral party than the Secretary of Commerce if the CZMA is to supervise program management. However, if CZMA is viewed as a funding mechanism to sponsor state planning, and not viewed as having program approval as a goal, it may be successful.

State Coordination

The Act provides that the states must work closely with local governments in developing and implementing a coastal zone management program. The Act requires that states either establish standards for local implementation of the state's program, subject to state administrative review of local or private project and resource uses, or establish direct state authority over land and water use planning.[36] This provision, while simple in appearance, mandates some revolutionary changes in our state structures. We shall investigate the implications of these alterations utilizing New York as an example.

Either option toward structuring coastal zone management in New York State involves redistributing existing police power capabilities. The first option would require

the state to set standards and review local actions. The second option would require the state to usurp local control entirely. Since cities, counties and special districts are creatures of the state and exercise only those powers specifically delegated to them,[37] the state probably possesses the means to require either option. Some would argue that the latter alternative is precluded due to the Home Rule Provisions of the New York State Constitution.[38] This constitutional guarantee of municipal powers is further buttressed by the Statute of Local Governments which specifically provides that cities, towns and villages shall have the power to issue zoning regulations.[39] Conceivably, this power would conflict with a coastal zone management scheme.[40] Even if these protections of municipal authority would not prevent the adoption of either option, they do indicate that any proposal is likely to meet with less than overwhelming support from municipal corporations which stand to lose authority under the CZMA.

There is also the practical problem of integrating the coastal zone management authority with existing governmental organizations. Not only does government in New York State incorporate counties, cities, towns and villages, but a number of regional authorities such as the Adirondack Park Agency or the Lake George Commission exercise police powers as well. A quick look through McKinney's will indicate the following local government entities which are involved in protecting our environment: Agricultural Districts;[41] Conservation Advisory Councils and Conservation Boards;[42] Environmental Management Councils;[43] Flood Plain Districts;[44] Forest Districts;[45] Freshwater Wetland Districts;[46] River Basin Commissions;[47] Soil and Water Conservation Districts;[48] Watershed Protection Districts;[49] Wildlife Habitats;[50] and, of course, the usual water and sewage districts formed at the local or county level.

Interpretation of the policies and operations of these existing programs seems a necessary accomplishment if comprehensive review of the water and land uses of our coastal zone is to be undertaken. Some of the districts are advisory only; some already provide for state supervision of local program development and operation; some operate with little state supervision while possessing important police power capabilities; and some, such as the River Basins, will be subject to alteration only with the approval of other states.

This suggests that the process of creating a coastal zone management program in New York will entail more than a survey of existing coastal uses. To provide coordination with existing environmental programs, a review of all laws and programs will be necessary. In addition, the creation of a management program will require the integration of all existing programs if it is to be effective.

In evaluating the two program options for coastal zone management under the CZMA, it is apparent that the guideline - review structure holds more promise for New York, than does direct state control. In light of the existing criticisms of the Adirondack Park Agency, the latter option appears politically impracticable. Additionally, the geographical diversity of the State, the needs for local participation and the existing policies favoring local control argue for the former option. Given this assumption, what form should the guideline - review structure take?

An initial consideration would be the geographical area or size the local management boards should be formed around. Utilizing an existing structure would serve to heighten the political vitality of the program. Several options are available.

The smallest form of organization would be one tied to the existing city, village or town. Environmental Management Councils[51] or the local legislatures serve as an

example of this approach. This form has the advantage of following an existing structure which currently plays an important role in New York State government. The precepts of home rule dictate that the local municipality should be involved in any coastal management program. Public participation is more readily available at the local level than at other levels of government and the municipality may serve as the best means of involving the public in coastal management.

There is, however, room for skepticism. The ecology of our coastline is far too diverse and diffuse to be effectively supervised by a series of municipalities. State standards and review would help to alleviate this problem, but the review process would be difficult given the number of municipalities and the diversity of their interests. Local prejudicies or economic concerns may preclude effective management. A coastal commission founded upon local government might well be subject to the well known abuses of the local entity.

A second possible form of the coastal commission would be a property or special district. The Agricultural Districts[52] provide an example of this concept. Such a body would have the advantage of being larger than one given municipality and thus be suggested for that reason. This, however, has the disadvantage of necessitating the establishment of a new layer of government which would have to be endowed with the necessary powers. Citizens, would not be used to this form and other governmental structures would probably be unanimous in their objections to the creation of such an entity.

The county government provides a third form of jurisdiction for the supervision of the coastline. Because the county encompasses a larger area than the city it would be more amenable to a comprehensive approach. Disadvantages rest on the limited authority and influence counties currently exercise. To date, they exercise no zoning

powers other than the authority to coordinate municipal regulations in one limited situation, and their authority to regulate subdivision development is also carefully circumscribed.[53] Arguably, this might be viewed as a positive factor allowing for management of the coastline without being tied to defined interest groups or past practices.

Other forms are also available. Regional or multi-county commissions could be established.[54] Possibly, the geographical scope of the commission could be dependent upon local decision. This increases problems of supervision, but may be the easiest to attain politically.

Together with the form of the local coastal zone commissions, the organization with the state government must be determined. The state structure must be designed to supervise and coordinate the policies and decisions undertaken by the local commissions. Ideally, the state organization would coordinate the policies of the existing environmental programs with those of the coastal zone management. Significantly, the Department of Environmental Conservation suggests itself for this purpose. Already responsible for the management of a number of environmental programs within New York State, the D.E.C. Staff could be expanded and additional supervisory functions for existing programs could be added to its jurisdiction.

Alternatively the state structure might be independent of existing agencies. This would guard against submission to existing special interests, but would acquire the problems incumbent in the creation of a new bureacracy. The program could be directed by a commission made up of secretaries of existing departments such as Economic Development, Agriculture, and Environmental Conservation. A further possibility exists in having the policy board made up on such a basis, but utilizing the staff of an

existing agency for administration. Obviously, the possibilities are numerous.

Once the organizational structure of the state and local coastal program system (or in the event of direct state control merely the state organization) is determined, the procedures for development and management of the coastal zone program must be established. This function is extremely important to the vitality of the program and careful attention must be paid to avoid the pitfalls suggested by the federal legislation and others that may arise.

Intergovernmental coordination and cooperation is essential to the success of the CZMA. This paper has suggested a number of conflicts which emanate from the Act, which must be solved to sponsor success. Obviously, the difficulties noted only begin to describe the problems to be encountered. Continued attention to the conflicts and continued devotion to the goals of coastal zone management will hopefully prompt our governments and leaders to surmount such difficulties and bring to the public a healthy coastline.

Footnotes

1. Report of the Commission on Marine Science, Engineering and Resources, Our Nation and the Sea - A Plan for National Action 49 (1969).

2. Hershman and Folkenroth, "Coastal Zone Management and Intergovernmental Coordination," 54 Oregon L. Rev. 13, 14 (1975).

3. Swicky and Clark, "Environmental Protection in Coastal Zone Land Use Legislation," 1 Coastal Zone Management J. 103 (1973).

4. 16 U.S.C. § 1451 (g) (Supp. II 1972); 16 U.S.C.A. 1451 (g) (Supp. 1976).

5. 16 U.S.C. §§ 1451-64 (Supp. II 1972).

6. Id. § 1452.

7. Id. § 1454.

8. Id. § 1455.

9. Id. §§ 1453 (f), 1454 (a), 1463.

10. Id. § 1456 (b).

11. Id. § 1456 (c) (1)-(2).

12. Id. § 1456 (c) (3).

13. Id. § 1456 (d).

14. Id. § 1451 (h).

15. As President Nixon stated in signing the Act: "This bill also recognizes that the states can usually be the most effective regulators of such a planning process. I will instruct the Secretary of Commerce to carry out this statute in a way which focuses federal efforts on the adequacy of the state process rather than to become more involved in the merits of particular land use decisions." 8 Weekly Comp. 1583 (1972).

16. See, e.g., the figures listed for fiscal year 1974 in Hershman and Folkenroth, "Intergovernmental Coordination," 17.

17. 33 U.S.C. § 403 (1970). This act grants to the Corps of Engineers authority to supervise the management of navigable waters.

18. 16 U.S.C. §§ 661-66 (1970). Authorizes the Department of the Interior to approve and supervise federal activities affecting the bodies of water and water resource development for the protection of wildlife.

19. 42 U.S.C. §§ 4001-127 (Supp. 1 1974). This program requires the adoption of flood plain ordinances by state and local entities which may conflict with CZMA decisions.

20. 16 U.S.C. §§ 1001-09 (1972). Authorizes the Secretary of Agriculture to administer programs for soil and water conservation within watershed areas. The plans are developed in conjunction with landowners and soil and water conservation districts.

21. 33 U.S.C. §§ 1251-376 (1972). Authorizes the Environmental Protection Agency to maintain the quality of our waters. The CZMA specifically precludes authority to interfere with EOA standards (16 U.S.C. 1456 (f) (1972). However, the EPA reviews Corps of Engineers' permits and this authority will overlap.

22. 42 U.S.C. § 1962 (1970). Authorizes the Water Resources Council to establish standards for federal and federally assisted water and water related land resource projects.

23. 42 U.S.C. §§ 4321-47 (1970). Requires Environmental Impact Statements for federal programs.

24. Publ. L. No. 93-627 (1975). Authorizes the Secretary of Transportation to license crude oil importing facilities. Requires "reasonable progress" toward the development of a coastal zone management program.

25. Proposed. Land Use Policy and Planning Assistance Act, S. 268, 93d Cong., 1st Sess. (1973). Would encourage the development and implementation of state comprehensive land use plans.

26. Proposed. H.R. 7173, 93d Cong., 1st Sess. (1973). Would establish beach program, shoreline erosion program.

27. Proposed. H.R. 180, 93d Cong., 1st Sess. (1973). Would control siting of power plants.

28. Under the Supremacy Clause of the Constitution, U.S. Cont. Art. VI, state laws which conflict with federal laws are inoperable. The companion doctrine of preemption states that where Congress has thoroughly regulated a field, state legislation in that area will be invalidated. See, e.g., Southern Pacific Co. v. Arizona ex. rel. Sullivan, 325 U.S. 761, 769-70 (1945); Rice v. Saute Sante Fe Elevator Corp., 331 U.S. 218, 230 (1947); Florida Lime and Avocado Growers Inc. v. Paul, 377 U.S. 132, 141 (1963) for the classic statements of this doctrine.

29. 16 U.S.C. §§ 1456 (c) (1972).

30. Given the expressed purposes of the Act, this assumption appears reasonable.

31. 16 U.S.C. § 1456 et seg. (1972).

32. See, e.g., Hershman and Folkenroth, "Intergovernmental Coordination," 31.

33. Id. at 24-27, 29.

34. 16 U.S.C. §§ 1456 (c) (1972).

35. Hershman and Folkenroth, "Intergovernmental Coordination," 29.

36. 16 U.S.C. §§ 1455 (e) (1972).

37. Hunter v. Pittsburgh, 207 U.S. 161, 177-180 (1907).

38. N.Y. Const. Art. IX 2 (c).

39. Section 10, Subd. 6., enacted pursuant to Article IX of the Constitution. The Statute of Local Governments may be amended only by the enactment of legislation approved by the Governor at regular sessions of the State legislative in two successive calendar years. This makes amendments extremely difficult.

40. However, the operation of the Adirondack Park Agency pursuant to the Adirondack Park Act, Executive Law, 801 et seg., suggests that these objections are not insurmountable. While the governmental agency exercising authority over the coastal zone would possess powers greater than those of the Agency, the analogy appears appropriate.

41. Agricultural and Market Law, Art. 25AA. (1971). Provides for the formation of agricultural districts designed to protect farmers from rising property taxes and to discourage the development of agricultural land.

42. General Municipal Law § 239x. (1970). Authorizes municipal legislative bodies to appoint councils to advise in development, management and protection of natural resources.

43. Environmental Conservation Law. §§ 47. Authorizes county to establish council, consisting of one representative from each municipality, to advise county on conservation and preservation of resources.

44. E.C.L. § 36-0101. (1974). Requires local participation in federal flood plains program. Should a locality fail to meet federal requirements, the Department of Environmental Conservation is enpowered to step in and act for the locality.

45. E.C.L. Art. 9. (1972). Calls for the creation of 21 forest district boards to run a cooperative forest program in the state.

46. E.C.L. Art. 24. (1975). The D.E.C. is empowered to identify all wetlands in the state. Local governments must then regulate the use of such wetlands in accordance with D.E.C. guidelines. Failure of the locality to regulate empowers the county, and failure of the county empowers the D.E.C.

47. E.C.L. Art. 21. (1972). Authorizes and empowers a series of multi-state compacts for the conservation, utilization, development, management and control of the water and related resources of the various basins.

48. Soil and Water Conservation District Law, Chapter 52 B. (1972). Empowers counties to create districts which are authorized to study and recommend land-use, farm-practice and water-drainage guidelines. Districts may undertake projects and must develop a comprehensive plan which the state approves.

49. County Law, Ch. 11, Art. 56. § 2991 et seg. (1972). Empowers the county to create watershed districts. District will study area needs and prepare a project plan. The district is then charged with implementation of the plan. Projects may be financed through special assessments.

50. E.C.L. Art. 11. Empowers the state to create wildlife preserves and to contract with counties for protection of the wildlife. Creates fifteen regional boards.

51. See note. 44, supra.

52. See note. 42, supra.

53. See, e.g., General Municipal Law § 239.

54. California has adopted this form. 13 San Diego L. Rev. 253 (1976).

COASTAL ZONE

MANAGEMENT ISSUES

CONFLICTS IN MANAGING THE COASTAL ZONE:

LEGAL vs. ECONOMIC REMEDIES

by

Charles R. Bailey

CONFLICTS IN MANAGING THE COASTAL ZONE: LEGAL vs. ECONOMIC REMEDIES

Charles R. Bailey

The coastal zone is a narrow transitional ribbon between the land and the ocean. Definitions of the width of the coastal zone shoreward and seaward of mean high water mark vary, yet all observers agree this region contains major natural resources: moderate climate, dramatic scenery, good soils, mineral wealth, and abundant water, fish, and wildlife. The coastal zone's per hectare biological productivity exceeds that of any other part of the earth's surface. It should come as no surprise that 50 percent of all Americans live within 50 miles of a coast. The coastal zone is a natural locus for transportation, manufacturing, mineral extraction, energy and food production, recreation, and aesthetic refreshment.

These many resources and activities mean strong competition and frequent conflict among different land uses. Since much of the coastal land is in private hands, public policy for land use planning and management must address private property rights, conflict resolution, and social efficiency and equity. The law addresses these issues through legislation and judicial testing of that legislation against the Constitution and the common law. These issues are also the province of welfare economics expressed in theoretical concepts such as general equilibrium analysis and Pareto efficiency, and in more practical form through benefit-cost analysis and deliberate adjustments to the price system. This paper examines legal and economic approaches to solving a public goods problem--the preservation of natural environments in the coastal zone.[1]

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[1] The same principles apply to maintaining open space or low density use in the face of pressures to upgrade a tract of land to a "higher value" (i.e. more developed) use. Other aspects of multiple competitive land use in the coastal zone, e.g. managing common property resources, and negative externalities in production or consumption, lend themselves to legal and economic analysis, but are, alas, beyond the space limitations of this paper.

Private Property and Public Management

The institution of private property has been part and parcel of the development of the American republic. Belief in the sanctity of private property, particularly real property, has been more widely shared and deeply felt among Americans than commitment to any other civil right. For immigrants arriving in the United States in the 19th and early 20th centuries the concepts of freedom and the right to hold their own land in fee simple were virtually identical. People viewed land as a commodity whose function was to permit its owner to make the maximum profit. Where government regulation of private real property existed as with urban zoning, the intention was to enhance land values. In more recent times, population growth, changes in tastes, growing incomes, and technological advances have increased competition among alternative land uses as well as technical externalities arising from individual or corporate activities. At the same time growing numbers of citizens have come to view land as a resource as well as a commodity. Government intervention or attenuation of private property rights is becoming increasingly frequent as a means of monitoring and guiding land use for the benefit of the community and of future generations.

Federal executive and legislative involvement in nation-wide land use planning however, is still a politically sensitive topic. Major federal legislation provides a national framework for husbanding air and water resources, but similar legislation governing land resources has not been able to get through Congress. In 1972 Congress made a start in this direction by passing the Coastal Zone Management Act with virtually the same purposes and approach as proposed comprehensive land use bills. This Act establishes a national policy "To preserve, protect, develop, and where possible, to restore and enhance, the resources of the nation's coastal zone." Achieving these

purposes will in fact require comprehensive land use management. A second policy goal is "To encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs."[2]

To implement this policy the Act provides Federal funds to states to develop and administer their own coastal zone management programs. There is also a second carrot: once the Federal government approves a state's program, the program automatically applies to all future Federal activities in the coastal zone of that state. This permits comprehensive and consistent management in the coastal zone. It is also a significant devolution of Federal power to the states, which perhaps explains why the Federal government has proceeded slowly and with caution. Of 30 coastal states only one (Oregon) has developed a program which has received Federal approval.

The Act is of interest to lawyers and economists because of its potential modification of legal rights and economic processes. Section 306 specified that a state coastal zone management program must provide for any one or a combination of three approaches to management control:

(1) Local regulation consistent with state criteria and standards. (This is analogous to the implementation of the clean air and water quality acts where states regulate in accordance with Federal standards.)

(2) Direct state regulation. (Hawaii, Vermont, and Maine already have this kind of land management legislation.)

(3) State administrative review of local plans, projects, and regulations to ensure consistency with a state-wide management plan. (The only example of this approach so far is Florida's Land and Water Management Act of 1972).

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2 Coastal Zone Management Acts of 1972, "Preamble".

Nineteen states currently have their own coastal zone legislation, and of these, 12 take the second approach.[3]

All of these approaches emphasize the legal and regulatory procedures over the economic policy instruments available for achieving the purposes of the Act. In actual operation we will see a thicket of permits, administrative reviews, and public hearings for sorting out people's conflicting interests and rights. Judicial interpretation and political log-rolling will, over time, work out reasonably equitable accommodations to conflict. On the other hand, can economic tools be practical and perhaps more efficient in some kinds of conflict resolution in the coastal zone?

Private Rights in the Land

Following the publication of Ronald Coase's article[4] on social costs economists Warren Samuels, John Dales, Harold Demsetz, Alan Randall, J. M. Buchanan and others have been exploring a new avenue of analysis termed the "property rights" approach. In essence, this analysis is the application of neoclassical microeconomic methodology to institutional questions. In its positive form this approach uses constrained utility maximization[5] to predict individual (and aggregate) reactions to existing or potential structures of

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3 A. H. Berger, "Method of Control of Land and Water Uses in the Coastal Zone", Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, October, 1975, p. 19.

4 R. H. Coase, "The Problem of Social Cost", Journal of Law and Economics, October 1960, reprinted in Mansfield, E. (ed.) Microeconomics: Selected Readings, p. 423.

5 A mathematical and conceptual technique for finding that combination of quantities of different goods which maximizes a typical individual's utility function without expending more than his total income.

rights.[6] Rights are decision-making powers which belong to individuals, or groups of individuals, and are created and enforced by social customs and government. Rights in property are ". . . the set of economic and social relations defining the position of each individual with respect to the utilization of scarce resources."[7] Property rights thus condition the utility function of individual decision-makers, and through the behavior of these individuals determine the allocation of resources, the composition of output and the distribution of income.

The property rights economist maintains that economic efficiency[8] is achieved by a non-attenuated structure of rights in conjunction with perfect competition and zero transactions costs. Non-attenuation means rights which are completely specified to reduce ignorance and uncertainty, are exclusive in the sense that all benefits and costs are explicitly accounted for, and are enforceable and transferable. This being true,

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6 A. Randall, "Property Rights and Social Microeconomics", Natural Resources Journal, 15, October 1975, pp. 729-747, presents the best overview of the property rights scholars. He would prefer to call this analysis the "incentive structure approach" but defers to the more widespread term "property rights approach." Another good review of the literature is E. G. Furubotn and S. Pejovich, "Property Rights and Economic Theory: A Survey of Recent Literature", Journal of Economic Literature, 10, December 1972, pp. 1137-1162.

7 Furubotn and Pejovich, op. cit., p. 1139.

8 For an economist, a situation of property rights "B" would be more efficient than a "A" if i) everyone feels they are better off with "B" than with "A", or ii) at least one person feels better off with "B" and no one feels worse off, or ii) those who feel better off with "B" can compensate those who do not, and still have a net gain. Conceivably, some situation of property rights might not permit efficiency in this sense. Also, every situation which is efficient may yield a different distribution of resource returns. Whether one distribution is more equitable than another must be determined socially or politically. In sum, the economist is seeking a structure of property rights which is socially efficient; political participants are more concerned with how the structure affects their own privileges and perogatives now and in the future.

markets or market-like institutions rank higher than other organizational forms in terms of efficiency. On the other hand, where market institutions entail high transaction costs or where conditions of perfect competition do not prevail some other institutional arrangement may be preferable in efficiency terms.

The lawyer comes at the question of property rights from a different angle. Real property is a bundle of rights whose strands once all lay in the hands of the owner who had control over the piece of land "from the center of the earth to the zenith of the heavens." In American law the right of ownership in private property still consists of the right to use it, to change its form and substance, and to transfer all rights in it through sale, or some rights through rental or other agreement. These rights are exclusive in the sense they are limited only by explicit restrictions stated in the law as it is currently interpreted. What this means is owners have an infinite bundle of rights in the land except as some of these rights are appropriated or attenuated by the prevailing definition of the law. The historical trend has been for the government to take more and more rights from the individual property holder's original bundle. Thus the legal question in land management is the proper balance between public and private rights in private real property.

We are seeking that solution to a conflict which maximizes net social product, but what does this mean? To the lawyer it is very often an alteration in the structure of property rights in ways he hopes will work toward some government policy goal. To the property rights economist, maximizing the net social product means fuller and more complete specification of property rights followed by a process of bargaining and trade until the gains from trade are exhausted. Historically, the legal approach has dominated.

However, it is possible that a new market institution -- trade in development rights -- offers an economic solution to a particular land use problem, the preservation of coastal zone natural environments.

Preserving the Natural Environment in the Coastal Zone

Natural environments are becoming more and more scarce in the coastal zone. These environments provide benefits such as absorption of flood waters, fish breeding, wildlife preservation, and simple open space; and are public goods in DeSerpa's two-dimensional sense.[9] Preservation of natural environments often reduces to a question of whether private property should move from a low to a high density, and consequently, a higher valued use. Should owners of tidal marshes and coastal wetlands be enjoined from filling them for residential or commercial development? Many coastal states now regulate this activity, which has provided the courts an opportunity to test the attentuation of private property rights involved.

State and local government have several land management tools at their disposal: property and other kinds of taxes, different methods for financing major public works, spatial layout and location of public improvements or services, the police power for regulating and zoning, and the power of eminent domain. Preservation of natural environments has relied on the last two methods, particularly the police power. The state can employ the police power, subject to due process, to limit private property rights in favor

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9 That is, every individual gets 100% of the service provided by the public good, and simultaneously shares it with all others. Natural environments also provide a kind of "reverse" public benefit in the sense their preservation satisfies a new anti-growth ethic in many small communities whose residents view land development as a harbinger of crime, congestion, and increased taxes.

of the public health, safety, and welfare without having to compensate affected private property owners. Regulations under the police power are usually those which prevent some harm to the public from the use per se. The power of eminent domain lies at the opposite pole from the police power in regulating land use, and entails a physical taking of the property with constitutionally-guaranteed compensation through due process of law.

An increasing number of land management conflicts, however, fall in the middle ground between legitimate exercise of the police power and the power of eminent domain. In the 19th and early 20th centuries judicial opinion did not connect an "excess" of the police power with a constitutional taking. Eminent domain only applied to actual physical invasion or taking. But in Pennsylvania Coal Co. v. Mahon (1922) the Supreme Court made this connection and instituted a test which balanced the public interest in the regulation (i.e. the degree of harm which would be prevented) against the effect of regulation on the land's value and the number of legitimate remaining alternative uses.[10]

Obviously, balancing is a relative thing. In Maine v. Johnson (1970) the state supreme court required the Maine government to compensate a landowner whose land had been reduced to zero commercial value because the state's wetlands act prevented him from filling and developing it. Two years later, a Wisconsin court in Just v. Marinette Co. sustained that state's wetlands act, ruling that the Justs were not entitled

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[10] In contrast to Penn Coal two other Supreme Court cases denied compensation to owners of business properties which became virtually valueless because of state regulatory measures. Kansas was not required to compensate brewers after that state government declared prohibition (Mugler v. Kansas, 1887), nor did Pennsylvania have to pay off margarine producers after that activity was outlawed. (Powell v. Pennsylvania, 1922). Good legal analyses of "takings" are given in F. Bosselman et. al., The Taking Issue, Council on Environment Quality, July 1973, 329 pp., and in the "Fourth Annual Report" of the CEQ, Sept. 1973, pp. 121-153. The Natural Resources Defense Council's "Who's Minding the Shore?" also has a good summary.

to compensation for their property because alternative uses remained (recreation), and because they had suffered no real dollar loss, only a foregone windfall gain from selling their filled land. The key fact in deciding this case was the harm that filling the Just's land would cause adjacent properties through increased probability of flooding. The decision read,

> "An owner of land has no absolute and unlimited right to change the essential natural character of his land so as to use it for a purpose for which it was unsuited in its natural state and which injures the rights of others. The exercise of the police power in zoning must be reasonable and we think it is not an unreasonable exercise of that power to prevent harm to public rights by limiting the use of private property to its natural uses."[11]

In 1974 Justice Douglas extended the meaning of the police power in Village of Belle Terre v. Borass, writing for the majority that

> "The police power is not confined to the elimination of filth, stench, and unhealthy places. It is ample to lay out zones where family values, youth values, and the blessing of quiet seclusion and clean air make the area a sanctuary for people . . ."[12]

In sum, the evolution of judicial opinion appears to be siding with careful, but increasing attenuation of private property rights without compensation. This is the legal contribution to resolving land use conflicts in the coastal zone. What do the economists have to offer?

One approach is to compare the market returns of land in its natural state to that land after development. Unfortunately, the market would not correctly weigh the returns to each use. For example, if building a factory in a previously undisturbed environment produced pollution externalities, the marginal social cost of development would exceed

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[11] Quoted in Council on Environmental Quality, op. cit., p. 147.

[12] Quoted in S. R. Bosworth, "A Review of the Administration of Coastal Regulatory Programs and a Memorandum on the Constitutional Limits of the Police Power," State of Connecticut Department of Environmental Protection, August 1975, p. 27.

the marginal private cost to the developer.

Similarly, with the preservation of a natural environment the marginal social benefits are greater than the marginal private benefits. There are several reasons for this. First, many natural environments are unique and therefore have no close substitutes in demand. Imagine a textbook downward-sloping demand curve, and suppose the area under this curve measures total social benefit from the natural environment. Since there are no close substitutes, the demand curve will be nearly vertical (highly price inelastic). Any market price will yield a total revenue to the land owner which under-represents the total benefit to society of that natural environment. Alternatively, suppose the owner used his land for a housing development. This would probably have many close substitutes in the locality, its demand curve would be more nearly flat (highly price elastic), and private gain would more closely approximate social benefit.

There is a second reason why the market undervalues natural environments. These environments have social value in the sense their existence provides an option to people to visit them, or gives satisfaction to people in just knowing they exist. The private owner cannot appropriate these kinds of values, and yet they are definitely part of the social benefit accruing from preservation of a natural environment.

A third reason for market undervaluation stems from the fact natural environments usually only tolerate one exclusive use and development of such lands is nearly always irreversible. They are limited and even declining in supply. While changes in tastes currently are increasing the future value of scarce and unique natural environments, changes in tastes for any <u>particular</u> kind of developed land use will likely reduce its future value. Technology can have a similar differential effect. Some future technological

change could always depreciate the value of land developed to a particular use; in the example above the materials and layout of the housing development could become obsolete. Cost-benefit analysis can include expected technological changes in its calculations, but there is still an element of uncertainty in the future value of developed land. However, since the natural environment is not a produced good, it is unlikely to suffer a reduction in value from technological change. These two forces of changing tastes and technology should favor the preservation of a natural environment over its destruction by a private property interest.[13]

In sum, there are two aspects to the question of preserving natural environments: First, the unregulated private land market sacrifices the long run social good to short run individual benefit. Second, government actions to ensure the social good necessarily will harm some individuals, and both welfare economics and the law can require compensation. How the law deals with compensation has been discussed. For his part, the economist can suggest institutional arrangements which regulate the market to maximize the social product. If in doing this the operation of the modified market harms Able but benefits Baker, Carter, Davis, Edgcomb, etc., it is acceptable if these people (society at large) can compensate Able for the harm and still be better off, i.e., the net social product must be positive. A new institutional form termed "transferable development rights" (TDR) can (sometimes) accomplish this.

Preserving the Natural Environment by Transfer of Development Rights

TDR is a new land use policy tool which follows from the theoretical approach of

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[13] See A. C. Fisher and F. M. Peterson, "The Environment in Economics: A Survey," Journal of Economic Literature, December 1972, pp. 1-33.

the property rights economists. Potentially, it can cure the market undervaluation and social welfare problems just noted, and be a useful contribution from economists to land use management implied by legislation like the Coastal Zone Management Act.

Taking the TDR approach, some land in a community should be designated for natural environmental, open-space, or low density use, while other land is zoned for development. Owners of land in the first category receive "development right" (DR) units proportional to their acreage or assessed valuation. Landowners in the second category cannot develop their land beyond a specified density unless they purchase DR's from owners of land in the first category. In this fashion owners whose property rights are circumscribed by the zoning may nevertheless benefit from land development and higher land values in their community. TDR alleviates the usual situation where a community's land use plan and zoning creates windfalls for some and wipeouts for others. It also provides compensation to owners whose land has been designated for preservation, and may forestall legal actions which claim that preservation of natural environments, open-space, or low density restrictions constitute a "taking."

TDR has promise, but also problems.[14] If the area zoned for development exceeds the area which actually develops over the course of time, the demand for DR's will be low, and landowners in category one may not earn enough on DR sales to fully cover the loss in their own land value. Demand could be boosted by either down-zoning some land in the development category, or lowering the density ceiling above which landowners in category two must purchase DR's. Either action would meet strong political opposition

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[14] For a more complete discussion see R. L. Barrows and B. A. Prenguber, "Transfer of Development Rights: An Analysis of a New Land Use Policy Tool," American Journal of Agricultural Economics, 57, November 1975, pp. 549-557, L. E. Small, "Transfer of Development Rights: A Comment," op. cit., 58, Nov. 1976, pp. 761-762, and Barrows and Prenguber, "Transfer of Development Rights: A Reply," loc. cit., pp. 763-66.

from category two owners. An interrelated problem concerns supply of DR's. If the land in category one has only a few owners they could restrict supply and drive up DR prices with the result that category two land would develop less than if perfect competition prevailed in the DR market.

Perhaps the most serious problem however, is a divergence between the law and economics over TDR compensation. To the welfare economist the difference between market value before restriction and the use value after restriction of category one land represents the "harm" to the landowner. Following the welfare economics full compensation criterion, this landowner must actually receive equal value compensation for the harm in order for the government's land use decision to be economically efficient in the sense defined earlier. From the legal viewpoint, TDR creates an explicit property right in the "unearned" difference in land value between restriction and no restriction. This lends added weight to landowner suits claiming compensation and counters the judicial trend to deny compensation for more and more of the decrement in private property values caused by land use regulations. Finally, whether compensation must be given (welfare optimizing) or may be given (legal balancing), it should cover the extent of the harm. With TDR however, the amount of compensation is market-determined, and there is no assurance it will fully cover the "harm".

In Summary

The coastal zone contains many valuable natural resources which are under competitive pressure for different uses. Recent Federal legislation assists coastal states in planning and managing their coastal areas, but the management tools are primarily legal and administrative. Preservation of coastal zone natural environments is an important and difficult problem. Natural areas perform many socially beneficial functions, yet

their private owners can not capture all the benefits and therefore often seek higher returns by developing their land. Government regulation to keep land in its natural state can be judged a "taking" by the courts, and if this happens the landowner must either be allowed to develop his land or receive compensation from the government. Obviously the government cannot compensate everyone harmed by every economic change -- it is not possible financially, nor is it desirable unless one completely agrees with and supports the status quo distribution of income. The judicial trend therefore is toward a balance between private and public rights in private land which does not compensate individual losses resulting from government regulation. However, that regulation must be scientifically sound, tailored to a probable environmental damage, and reflect a state-wide land use policy.

From an economic viewpoint, the preservation of natural environments is the problem of optimal provision of a public good. The property rights economists emphasize the importance of property rights in the overall structure of incentives against which the individual maximizes his utility, and recommend market arrangements which specify property rights where these have never existed. TDR is a practical application of this line of reasoning to preservation of natural areas. It may not lead to an optimal level of this public good since the quantity of natural areas is determined by planning, political processes, and local geography. However, TDR can lead to a pattern of compensation which maximizes the net social product.

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APPROACHES TO MANAGING CONFLICT IN THE COASTAL ZONE

by

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APPROACHES TO MANAGING CONFLICT IN THE COASTAL ZONE

Wayne A. Marks

One of the current weaknesses in coastal zone management is the lack of development of management strategies. In response to this need, Professor Mark Hershman, of the University of Washington Marine Resources Center and one of our seminar speakers, has called for a "problem-oriented" management approach. In this approach, goals should be clearly defined, multiple-use issues identified, and caution should be taken not to overemphasize natural-systems dynamics.[1]

Professor Hershman explained past successes of natural-systems approaches (e.g., the ecological approach advocated by another seminar speaker, Dr. John Clark of the Conservation Foundation (in Coastal Ecosystems) as due to a prerequisite that environmental preservation is the goal to be achieved.[2] Typically, though, conflicts facing coastal zone managers do not involve unilateral goals; an environment-first goal may be advocated by only one of a number of competing interests. One might thus ask, what are some of the characteristics of coastal zone conflicts, and do these conflicts involve management problems unique to the coastal zone?

The coastal zone possesses ecological features of a dynamic nature unparalleled by other environmental areas. Wave action, biological productivity of estuaries, and tropical storms are but three examples of this dynamic nature. With two-thirds of the world's population concentrated near the coast,[3] one might have further reason to expect coastal conflict to present unique managerial problems. However, although the physical environment is unique, the manner in which conflict is generated and resolved

has many similarities with conflicts apart from the coastal zone. Difficulties with local zoning and land-use controls, air and water quality, preservation and development, and provision of recreational facilities occur both in the coastal zone and in inland areas.[4] This recognition is important -- otherwise classification of a conflict under the "coastal zone umbrella" may lead to artificial isolation of the problem, consequentially requiring a de novo consideration of how to resolve it and failure to capitalize on management experience in other environmental areas.[5]

Coastal zone managers face a primary problem common to other areas. Without competing interests, conflict would be minimal. Mediation of these interests requires looking at the social, economic, and political processes. The coastal zone may be considered as an assemblage of resources,

> the use of which must be optimized and subjected to a minimum amount of conflict. Such use involves the reconciliation of so great a variety of interests -- local, national, and international; conservationist and exploitative -- that management becomes a metaproblem. . .--a problem seen to be a single problem by society at large but upon closer examination found to be composed of a number of sub-problems.[6]

Some aspects of these metaproblems may lend themselves to scientific and technological answers, but many other aspects, arising from conflicting desires and needs, cannot be addressed by the natural sciences.[7] Conflicting values pervade mutually exclusive interpretations of how land and water resources should be developed in these metaproblems.[8] These values particularly clash when any development (or use of an area) has spillover effects. These spillover effects are found in three main resource uses:

(1) Uses of property resulting in direct encumbrance on the uses of other property;

(2) Uses of a commons to which others have an equal right; and

(3) Use of property that affects the health or well-being of others.[9]

In any management area, the most influential groups are the most likely to gain disproportionate benefits.[10] "New participants, once relatively poorly organized and under-represented, now are an integral part of the system; environmentalists are here to stay . . . environmental conflicts have pushed the bounds of politics far beyond the scope and means of conventional local governments."[11] Similarly, the bounds of politics are far beyond the means of management. This is not to say that political difficulties for management necessitate interest group suppression. On the contrary, for example, if environmentalist pressure is absent, the inequities of the "free-market" will come to bear -- resulting in the bids of private developers far outstripping bids for public use.[12] Thus the impact of interest groups has economic as well as political implications.

Competing interests (regardless of expression by organized or unorganized interest groups) are but one characteristic of coastal conflicts that are not unique to coastal problems. Other traits may also be isolated -- for example emotive decision making as in the super-tanker port controversy off the coast of New Hampshire[13] and status quo inertia to change, [14] & [15] -- but a detailed listing would belabor the point. Though dynamic ecological factors in coastal management are unique, these factors are but one component for management consideration in conflict situations arising because of, for example, competing interests which are not unique to the coastal zone.

Presented with a conflict situation, the coastal manager faces operating constraints. Foremost is that agencies designed to engage primarily in "management" functions almost never have the structure or incentives to deal with questions of access, conflict resolution, or equity.[16] More attention has been given to identifying environmental issues in the coastal zone than to how to manage coastal problems.[17] Management responsibilities in small communities are often fulfilled by non-paid officials who rarely are staff-supported.[18] Local governments lacking personnel, power, and information present a particularly frustrating work milieu for the outside management consultant.

The question of what constitutes social equity will tax the coastal manager. But taxing the manager is not the danger. Rather, if interest groups predominate, then questions of social equity may be relegated to a superficial status at best. If social inequities blatantly result from conflict resolution due to the force of a particular interest group, then the manager may face an eroded public confidence.

Public confidence is a prerequisite for public support. To insure public confidence, the manager should consider how to best gather citizen input and ensure citizen access to the decision-making process. Citizen participation is desirable in agency policy-making not only because it promotes justice and ensures greater confidence but also because it facilitates the enforcement of administrative programs which depend on public cooperation, averts disruptive criticism, and satisfies judicial demands that agencies employ high and consistent standards in their procedures.[19]

In seeking citizen participation, the manager will find that a cross-section of citizens will be difficult to obtain. It has generally been found that it is the younger,

more affluent, and better educated segment of the population that is environmentally concerned and politically active.[20 & 21] If the manager relies on public meetings in an area where even this segment is not active, then he may find that those citizens participating are concerned with only their parochial interests: restrictions on private property, shoreline erosion, water levels, and general concerns fearing government red tape and loss of local control if any comprehensive approach is suggested to resolve the local conflict.[22]

The manager not only has to struggle with the milieu of small communities and agencies, equity questions, and public participation, but also with legal parameters restricting desired action. His management aspirations may be caught in the mire of institutional authority.[23] Washington State, for one, has encountered legal problems with its lengthy shoreline permit procedures.[24]

The coastal zone manager is not blessed with the luxury of a firm data base -- this is especially true in assessments of costs and benefits of actions. Bostwick Ketchum pointed out:

> The base-line and process data necessary for identifying the full costs and benefits of alternative choices for coastal use are frequently inadequate or lacking. This is particularly true of the information about the social, economic, and psychological transactions of humans that relate to the coast.[25]

Even ecological inventories have been deficient. Washington State experience has been that local shoreline inventories were too general to guide permit decisions. Consequently, local officials had to depend on helpful but limited outside expertise.[26]

The available data do not provide detailed or consistent information about single-project or cumulative effects on shoreline or estuary ecosystems.[27] The dilemma is that the costs in time and money of obtaining the information for a particular conflict

resolution may be prohibitive and force the decision-maker to act on the best possible analysis of the available information.[28]

The Manager's Approach

The initial decision for the manager is, what orientation should he have toward resolving coastal conflict? Should he assume a role of scientist/ecologist? Problem-solver? Compromiser/bargainer? Confronter? Should he assume one role for all problems or a different role for different problems?

Scientist/Ecologist

Dr. John Clark of the Conservation Foundation defines the goal of coastal management to be "best achievable ecosystem function" -- the maintenance of coastal ecosystems at the highest achievable level of quality, which means as near the natural condition as possible.[29] Under the ecological orientation, an environmental management program must embrace the whole ecosystem -- managing one component will fail. A few principles may be outlined which guide decision-making in this ecological orientation:

(1) There is an upper limit to the carrying capacity of man's environment;

(2) Survival of even a steady-state population is dependent on maintenance of the natural environment;

(3) Changes in an ecosystem caused by man are generally disruptive and the occurrence and character of such disruptions are frequently unpredictable; and,

(4) Costs of correcting damage to an ecosystem usually far exceed the costs of preventing it.[30]

Though the above ecological considerations have merit, there are some deficiencies in a strict ecological approach which should be noted. First, there is the limitation of

available scientific knowledge. As has been pointed out in relation to wetlands, "The connection between wetlands plant production and aquatic fish and shellfish production is an extremely difficult relationship to measure with precision and . . . the effects of wetlands destruction have not been studied adequately, particularly for the larger estuaries."[31] But, lack of information does not damn the scientific approach -- other approaches also lack an adequate information base. And the lack of scientific information is not conventionally seen to be insurmountable (though one may argue to the contrary).

The scientific approach, though, does have great difficulty in dealing with precisely those characteristics common to coastal conflict: competing interests, notions of equity, public confidence, etc. One particular competing interest is represented in economic development. Economic arguments are forceful and not to be ignored by a "scientist manager;" otherwise they may be his doom. The Alaska pipeline is a particularly instructive example of the power of economics, teamed up with energy demand, in surmounting ecological fact.

Ecologists have not been aware of the force of economic arguments -- witness their use in attempts at quantifying the productivity of wetlands. Addressing this point, Richard Walker, an economist, noted:

> Developers will continue to swallow up wetlands to make profits whenever there is a bull market in land, unless the rules of private property and the market in these areas are altered drastically. I do not see arguments about wetlands productivity doing this, they only lead to economics and the acceptance of existing rules of the game. Real change requires a major revolution in human values and the legal and social organization of society.[32]

Some scientists may contend that their "value-free" discipline would be well suited to resolving conflicts of values. This is nonsense and particularly so if the scientist actually believes his discipline is "value-free." One such supposed "value-free" approach is John Clark's approach in Coastal Ecosystems.[33] In espousing a natural system to which development is harmful, Dr. Clark is unavoidably communicating a set of values. If he is not, then resolve this problem: What is the philosophical (not ecological) difference between the noble and "natural" beaver dam and a Corps of Engineers dam? Some scientists have difficulty recognizing their own values. Consequently, one might rightfully be suspect of the scientist's ability to reconcile differences in goals or methods by relying on his own values -- i.e., an ecological approach to coastal zone management. At best, this approach is accorded the same status as an economics interest group -- it is a mechanism for competing, not for resolving.

Problem-Solving

If a scientific/ecological approach is not sufficient or appropriate for coastal zone management, then is there another approach that is feasible? Lynton Caldwell, professor of political science at Indiana University, outlined three alternative approaches for resolving environmental conflict. The first of these is the "problem-solving" approach.[34] Professor Caldwell noted six conditions that favored using this approach:

(1) Where the issue can be stated as a solvable problem;

(2) When the way to overcome a generally perceived environmental hazard is not apparent or not known;

(3) When an environmental hazard is perceived as threatening to all sectors of society with substantially equal severity;

(4) Where the methods of coping wi th the situation neither favor nor disfavor particular groups or individuals;

(5) When there is a clear and present indication of public advantage in a solution to a problem; and

(6) Where there are institutional arrangemtns, distinct from techniques, through which the perceived problem can be studied and solutions implemented.

Professor Caldwell noted that when one or more of the conditions are absent, the approach may be rejected in favor of another. It is not hard to imagine a coastal problem where one of the above conditions would not hold. For instance, in relation to (3), a deepwater port may threaten some coastal preservationists concerned about development, but may benefit a particular group such as longshoremen.

Compromiser/Bargainer

The second approach of Caldwell is one of compromise and bargaining. Conditions favorable for this approach are:

(1) When science or confirmable evidence is inconclusive;

(2) Moral issues are complex and cannot be satisfied by any clearcut decision; and

(3) Opposing forces are sufficiently balanced to prevent any single interest from achieving a unilateral solution.

The deepwater port may not satisfy the Bargaining criteria, either, if there are no complex moral issues involved or the opposing forces are imbalanced.

Confronter

Confrontation is the third approach. Conditions favorable here are:

(1) When issues are place specific;

(2) When the scale of a "protected" area is questioned;

(3) When economics vs. ecology;

(4) When intellectual, moral, and ethical judgements are deeply held and incompatible; and

(5) When opposing forces are unevenly matched.

Here, it may occur that the deepwater port example would involve no questions as to the scale of a protected area. Thus, with three approaches exhausted, one single approach may not suffice for resolution of a coastal problem. Conversely, it may occur that a problem would have characteristics found in each of the three approaches, as well as a need for ecological analyses as in the scientist/ecologist approach.

The obvious conclusion is that any one approach may not be suitable for all types of conflict possible in the coastal zone. The coastal manager should have the flexibility to jump from an ecological to problem-solving, bargaining, and confrontation approaches. But, just as different types of conflict may arise and require different approaches for resolution, could it not also occur that a problem may require one type of approach at one time and yet a different approach before its resolution is achieved? Values change and surface sporadically, ecological arguments may have a time of force and a time of latency, equity considerations may come and go, and interest groups may acquire strength and visibility with time. The point is that the coastal environment is a dynamic environment. Its dynamic quality does not stop at natural, physical systems but also includes

the social, political, and economic considerations sure to arise in a conflict situation.

Where does this leave the coastal zone manager? Faced with the need to be an ecologist-problem solver-bargainer-confronter, the manager may be no better off than if he had no preconceptions about how to tackle conflict issues. But this is not so. It is an important step forward if the manager attempts not to tackle each new problem in a preconceived manner. This realization is echoed in Alfred Eipper's listing of human shortcomings important to recognize in a decision-making context:

(1) A tendency to oversimplify;

(2) Difficulty in recognizing, acknowledging, and acting on future possibilities which lie outside the realm of past experience;

(3) Overconfidence in man's abilities to correct environmental problems with technology;

(4) Failure to appreciate the necessity of ecological diversity;

(5) Tendency to rely on adopting old solutions for solving new problems;

(6) Tunnel vision: failure to appreciate the necessity of compromise and wide public representation in solutions of natural resource conflicts and failure to consider a sufficiently wide range of possible alternatives;

(7) Reluctance to participate in discussion and debate of policies and programs affecting the environment; and

(8) Inadequacy of man's understanding of ecological complexes to predict environmental effects of resource management schemes or to recognize occurrence of these effects until their later stages.[35]

Thus, "the most desirable mix of remedial techniques . . . will depend on the legal, political, and practical circumstances surrounding a given resource base" and conflict situation.[36]

A Closing Note

Regardless of the particular type of coastal conflict or the particular approach used for resolution of the conflict, ecology has significant merit in serving as the common denominator in the management of coastal conflict. This is based on the premise that environmental degradation is not suitable for the continued existence of the human species. On one hand, it may be argued that this is a value statement, but on the other hand scientific evidence is increasingly supporting the cicular relationships between man's activity and environmental effects and their subsequent impact on man. Avoiding controversy of whether ecological considerations should underly coastal management is simple. The Congress has mandated, in section 303 of the Coastal Zone Management Act, that it is the national policy "to preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone," a n d recognized an "urgent need to protect and give high priority to natural systems in the coastal zone." Thus, regardless of the approach taken, an underlying concern should prevail for protecting and enhancing the coastal environment.

Afterword

This paper has focused on conflict in the coastal zone. Having concluded that coastal conflict is not unique, management approaches for resolving general types of environmental conflict have been considered. No single approach has been deemed feasible for all types of problems or for any one problem from initiation through resolution. This recognition is an initial step in preventing premature closure of options in managing conflict.

The tendency to say, "OK, I know what not to do, but I still do not know what to do," should be avoided. First, the management approaches outlined in this paper may provide guidance for problem resolution at a particular time period, as long as caution is heeded to remain flexible to alter an approach or adopt a new one.

Second, regardless of the management approach taken, guidelines from recent work on how to tackle policy problems may be established. E. S. Quade, of the Rand Corporation, outlined some identification steps to take in analyzing a problem ("problem" is used here in a more general sense -- including bargaining and confrontation -- than in the "problem-solving" approach):

(A) Source and background of the problem;

(B) Reasons for attention;

(C) Groups or institutions toward which corrective activity is directed;

(D) Beneficiaries;

(E) Related programs;

(F) Goals and objectives;

(G) Measures of effectiveness;

(H) Framework for the analysis;
  (1) Kinds of alternatives;
  (2) Possible methodology;
  (3) Critical assumptions;

(I) Alternatives;
  (1) Description;
  (2) Effectiveness;
  (3) Costs;
    (a) Year by year
    (b) Public, private;
  (4) Spillovers;
  (5) Comments on ranking;
  (6) Other considerations;

(J) Recommendations that might follow.[37]

In-depth discussion of these management guidelines is beyond the scope of this paper. They do provide, though, some general guidelines applicable to a variety of approaches. Although this framework seems to be biased toward a "problem-solving" approach, it may be flexible enough to accomodate any management approach under its "(H) Framework for analysis" or (H) (2) "Possible methodology."

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34. Albert E. Utton and Daniel H. Henning (eds.), Inter-Disciplinary Environmental Approaches (New York, Media Press, 1974), p. 13.

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OPERATIONAL ASPECTS OF COASTAL ZONE MANAGEMENT

COASTAL ZONE MANAGEMENT IN THE GREAT LAKES BASIN:

An End to the Territorial Imperative

by

James T. Gaffney

COASTAL ZONE MANAGEMENT IN THE GREAT LAKES BASIN: An End to the Territorial Imperative

James T. Gaffney

The Coastal Zone Management Act of 1972 is in many ways a logical sequel to concurrent legislation directing governmental and private resource users to consider the impact of human endeavors on water systems within the United States. By funding a study which would allow each state to draft its own coastal zone legislation, subject to approval by the Department of Commerce, which would be binding on federal agencies having an interest in the coastal zone, it was thought that state participation and qualification would be a process of no great time duration. Yet as of March 1977 only one state had received full federal approval for its coastal plan. New York State's proposed management plan has foundered somewhere between the crests of rising expectations and troughs of geographical and bureaucratic complexities. Pending at the present time is a scheme which would divide the coastal regions of the state into three separate regions, each of which would submit its own, unique management plan. Partly in the interest of rising to the defense of the much maligned New York coastal zone planners and partly to bring to light an aspect of coastal zone planning seldom considered by commentators but one likely to be of pressing importance in future years, this paper is devoted to the problems of effecting a state coastal zone management strategy for the Great Lakes-St. Lawrence Basin.

Apart from the more obvious differences in management strategies needed to effectively manage a massive inland water body as opposed to the traditional marine

coastal area (based on dissimilarities in geology, biology, hydrology, and land use) the Great Lakes planner must contend with a new element--the interests of another nation. Realization of this has been and continues to be a hard pill for legislators to swallow. Like most seafaring countries the United States has traditionally regarded the major extraterritorial water bodies of the world as a common property resource there to be exploited to its utmost capacity, which was considered infinite. In recent years the depletion of the North Atlantic Fisheries and the sighting of coagulated oil globs at sea have served notice on nations of the world that the effects of coastal oriented activities have ramifications well beyond the territorial boundaries of each nation state. With the Great Lakes Basin, United States jurisdiction extends half way across each lake (except Lake Michigan) and the St. Lawrence, but the effects of resource users are felt shore to shore. The geological boundaries of the Basin are such that the combination of lakes and rivers form a virtually closed-end system in which man's oversights, mistakes, and waste products are not quickly washed to sea twice daily by tidal action. In fact, recent experience with Mirex in Lake Ontario and with taconite tailings in Lake Superior give credence to the notion that short term perturbations can have long lasting effects. These effects along with those of energy development, solid waste disposal, and fisheries development will be felt on both sides of the international line. Since the causes are jointly shared, any effective management policy which considers comprehensive planning must consider the interests of both countries.

That this policy has not been given adequate attention can be seen in two recent developments within New York State. The first is the effort in the NYS Senate to lift the ban on gas drilling in Lake Erie in order to preempt the Canadians from depleting shared fields under the Lake rather than initiating agreements which would produce a

joint and mutually beneficial program for gas development. The second is the recent St. Lawrence-Eastern Ontario Commission Law which spawned the like-named organization in an effort to develop a comprehensive plan for that segment of the Basin. Despite the fact that one half of the coastline in this area is Canadian owned, no mention was made of the need to solicit Canadian viewpoints. Equally telling was the absence of a requirement to consult with the only organization legally bound to oversee any project which might affect water levels or water quality in the boundary waters. (Weinberg, 1976). Be it the result of ignorance or self-interest this type of "mind set" represents the type of thinking which has dominated resource management in this area in the past and serves to perpetuate a fragmented, short range approach to planning.

However, if Canadian interests are to be fully represented in future management plans, a suitable legal framework will need to be devised which protects national sovereignty and guarantees equal rights for both nations. Given the institutional and legal incumbrances which currently exist, this task is not likely to be easy. The institutional problem is seen in the fact that no less than 34 federal, 5 interstate, 2 regional, and 10 state agencies as well as 5 transportation authorities and any number of local bodies claim jurisdiction over some American resource in the Great Lakes Basin. (Marr, 1976). Superimpose on this the considerable number of Canadian laws and agencies affecting Canadian use of the boundary waters (Cooke, Cooper and Pilon, 1970; Weinberg, 1976) and the resulting picture is one so complex as to send even the most thoughtful of planners into early retirement. Yet several artifices have been tried or proposed to circumvent the hazards posed by the nexus of federal, state, and provincial organizations.

The use of treaties and agreements between the federal governments has been the traditional approach to Basin management. The Boundary Waters Treaty of 1909 asserted

the equal rights of both countries to the resources within the Great Lakes and espoused a concern for pollution prevention. Out of this Treaty arose the International Joint Commission (IJC), an independent organization comprised of a small but equal number of representatives appointed by the chief executive officers of each country. At the behest of each government it could conduct surveys and research efforts on activities affecting either the water level or water quality of the Basin. Conflicts of interests between the two countries could theoretically be submitted to the IJC for binding arbitration. It is significant that neither country has yet sought redress of grievances in this manner. (Weber, 1966). Over the years references submitted by the respective countries have resulted in the expansion of research efforts on issues related to water quality and management which in turn paved the way for important improvements. The St. Lawrence Power Development Authority was created as a result of IJC approval. More recently, an IJC reference which grew out of a widespread concern over the eutrophication of Lake Erie resulted in the signing of the Great Lakes Water Quality Agreement in 1972. Five key objectives centered on preserving the lakes and tributary waters from the effects of putrifying substances, surface scum and oil, color and odor deterioration, toxic and harmful substances, and nutrient enrichment. (Clark, Dworsky, Frances, 1976). In the past decade the supervisory body of the IJC has had its authority broadened in research, investigative, and advisory roles and now can initiate studies on its own without the prior request of either federal government. Presently it oversees a Regional Office in Windsor, Ontario, the Great Lakes Water Quality Board, a Research Advisory Board, and a Pollution from Land Use Activities Reference Group (PLUARG). With the creation of PLUARG the IJC was given, for the first time in 63 years, some investigative power over land use activities.

In retrospect the treaty and agreement approach has by most accounts had a checkered record. The agreements have been devoid of a holistic philosophical rationale for specific activities undertaken by the Commission. Even though agreement was reached on broadly worded objectives, concerted action was never effectively undertaken on real problems. The result was an often fragmented approach to resource matters as evidenced by a separate Fisheries Commission which concerned itself with only one significant fishery issue, the sea lamprey. It also is behind the failure to reach common agreement on mineral resource exploitation and the failure to develop a plan to stem the deterioration in air quality which has had so devastating an effect on water quality in the region.

The character of the IJC itself represents well the status quo, "don't rock the boat" mentality of past agreements. Despite its research accomplishments, its reputation as a nonpartisan body with an unbiased viewpoint, and unusually strong relations with the federal institutions of both countries, the IJC has never reached its full potential. Its small size has saved it from bureaucratic entanglements, but it has at the same time brought about its reliance on agencies within the federal, state, and provincial governments of both nations for data collection and expertise. This has made its reports represent more the priorities, constraints, funding and program biases of the participating agencies than its own independent judgment. (Dworsky and Swezey, 1974). Another major criticism is that the IJC has never until recently had initiative authority to carry out its investigations. Thus it is subject to the response times traditional to large bureaucracies at the federal level. Further, it lacks any regulatory function, serving instead as a clearinghouse of reports on regulation violation for those agencies having narrow authorities over specific resource issues. As a product of the best and worst of treaty negotiations,

the IJC has avoided conflict between the two nations, but this is due in part to the refusal of either country to jeopardize its own interests by submitting a dispute to arbitration. The IJC has thus been a low profile organization, a fact which might be the reason for its longevity. The fact that it carries on its liaison work with both countries principally through their State and External Affairs Departments has meant that the IJC is virtually an unknown to the layman. Both public and congressional input into IJC activities have been scant. (Dworsky and Swezey, 1974).

Any agency which grows out of the IJC or supplants it will have to deal with the delicate, diplomatic issues arising out of competition for shared resources between the two countries as well as the disputes among the competing interest groups within each nation. That this may prove to be a Herculean effort can be seen in the issue of water level regulation. Unlike the marine ecosystems which are shaped by sometimes immense changes in sea levels, boundary waters of the Great Lakes Basin tend to be relatively static in this regard. What fluctuations do occur are gradual and tend to be conditioned by the climatic changes over the entire Basin area. The natural drainage patterns cause a shift in level patterns from West to East. It takes, for instance 3 1/2 years for the level changes on Lakes Michigan-Huron to be felt in the outflows of Lake Ontario. (Dodge 1966). During this period weather patterns in the Lake Ontario area could significantly exacerbate or mitigate the anticipated lake changes imposed from the Upper Great Lakes. Thus predicting level fluctuations with an eye toward resource planning is at least as risky as weather prediction. From the standpoint of water users lake levels are a prime example of the case where one man's windfall is another man's washout. Power authorities, transportation interests, and most recreational uses depend on high water levels. However, high levels are detrimental to property interests which abut the water

because of the erosive properties of wave action. Beach owners, especially, benefit from low water levels. Reconciliation of the competing interests has never been fully undertaken, but through its level regulation facilities on Lake Superior and Lake Ontario the IJC has been successful in limiting the periods of extreme levels to but a few years. It has recently been assigned the task of improving on the self-regulatory prowess of the Great Lakes system itself but due to the magnitude of the scientific problems in constructing a foolproof system and the competing users, it is unlikely that any changes will be made. (D. Dworsky, 1974). A study on the feasibility of the proposal concluded that the IJC had institutional weaknesses born out of the political environment in which it was created which would make it impossible to carry out the one function for which it has the longest standing legal authority.

> The nature of this particular organization, a governmental, bilateral commission, dependent on both nations not only for staff, budget, and agenda, but implementation-can only be to harmonize relations.(D. Dworsky, 1974, p. 3).

If treaties and agreements produce management methods which tend to harmonize at the expense of effective action, what other methods exist to force coastal zone planners to consider more than just American (or Canadian) interests? In a recent study on the subject (Weinberg, 1976) a persuasive case is made for the use of the courts as a method of protecting the interests of foreign nationals. The Boundary Waters Treaty of 1909 itself has two articles under which Canadians could bring suit against the American Government as a violation of a bona fide treaty. Under Article IV both nations are under obligation to prevent the pollution of boundary waters. Article II guarantees the payment of remedies for injuries suffered from the improper utilization of boundary waters by a member of another nation. Although no legal action has yet been taken under either of

these provisions, pending currently is an issue in North Dakota which could set precedent for such action. If the Bureau of Reclamation completes an irrigation project which would result in the increased salinization, nutrient load, and total dissolved solids load of a river which flows across the boundary into Canada, sufficient cause for legal action under Article II of the Treaty could be given provided the Canadians showed that their potential use of the river had been infringed upon. The author goes on to assert its possible applicability to New York State: "The Boundary Waters Treaty appears to be a particularly appropriate means by which Ontario's citizens could initiate legal action to obstruct the implementation of a New York coastal management plan affecting their waters." (Weinberg, 1976).

The question as to whether United States courts have the jurisdiction to hear cases brought before them on transnational environmental matters is being answered in the affirmative by such recent decisions as Michie v. Great Lakes Steel and The Wilderness Society v. Morton. Weinberg, 1976). One of the major roadblocks to true representation of Canadian interests, the lack of an avenue of influence over decision making, is now being hurdled by the extraterritorial interpretation of the National Environmental Protection Act. Although vigorously opposed by the State Department because of the restrictions which would be placed on much needed development programs in emerging countries, the international applicability of NEPA would have major ramification for all federal agencies, strictly bound as they are by all the requirements therein. If the Sierra Club wins its ongoing court battle against the Atomic Energy Commission on the issue of filing impact statements on nuclear power plants built on foreign soil impact statements which encompass the interests of foreign nations will soon be a requirement of agencies having a resource

planning function. For the Department of Commerce, which oversees the Coastal Zone Management Act, this would mean new liability for coastal zone programs which affect boundary waters shared with either Mexico or Canada. New York State, in turn, as a result of federal requirements to obtain grants, and as a result of its own Environmental Conservation Law would be bound to solicit the expressed interests of Canadians presumably through the hearing process for any activities which impact on Canadian interests. While the court system may broaden the scope of planning activities, it will not take the place of a single agency having a comprehensive planning function over the region in fostering long range perspectives and a total systems approach to planning.

Such an agency already exists, on the American side, in the form of the Great Lakes Basin Commission. Its concerns go well beyond those of the IJC to include consideration of the effects of land based activities such as agriculture/forestry, recreation, and solid waste on the receiving waters of the Basin. Its most recent report reveals a rare awareness of the jurisdictional limitations of American organizations with respect to data collection, policy making, and planning capabilities. (Great Lakes Basin Commission, 1977). Its own limitations stem from the fact that no counterpart Canadian organization exists to represent those interests. A joint Canadian-American planning agency, independent of support from organizations in either nation, taking a water basin approach to planning, and with regulatory authority to enforce relevant laws on either side is presently a fantasy given the unwillingness of either country to compromise its resource development rights. One thoughtful approach has considered the implementation of a International Public Corporation (IPC). (Weinberg, 1976). It would be constituted as

a commercial corporation but would function as an international governing body. Its authority would extend to the extractive/consumptive resources such as fisheries and minerals. With funds obtained from licensing resource users it would be financially independent. It is questionable, however, whether such a quasi-public corporation could effectively handle all the resource problems of the Great Lakes Basin.

If the formation of a single agency with broad jurisdiction over coastal zone management activities on both sides is at present unrealistic, there is some hope for improved management on each side through the use of joint legislation giving each nation full and equal representation in decision making at all levels of government. Today informal agreements exist between New York State and Ontario on matters such as sport fishing regulations. These could be extended. The signing of state-provincial compacts could contribute to improved management techniques were the Canadian laws more precise on the authority of provinces to conduct such agreements for resource purposes. (In the U.S. this would require a constitutional amendment.)

In short, legislative means exist to broaden the horizons of coastal zone management on the New York-Ontario frontier. One single best solution is not likely to evolve because of the complexities involved. If measures are not taken soon to remedy the one-sided approach to planning, court action is likely to accomplish the task in which diplomacy has failed for so long.

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COASTAL ZONE MANAGEMENT -

Some Insights Into New York State's Segmented Approach

by

Eugenia M. Barnaba

COASTAL ZONE MANAGEMENT - Some Insights Into New York State's Segmented Approach

Eugenia M. Barnaba

The American public in 1972 expressed a national concern for the nation's coastal resources by legislating through their congressional representatives the Coastal Zone Management Act (CZMA).

CZMA attempts to force state and local jurisdictions to consider non-economic values - ecological, cultural, historic, and aesthetic - in determining the future of coastal areas in return for federal grants to develop and implement land use plans in the coastal zone.

A major objective in the legislative intent was to encourage states to exercise their full authority over coastal lands and waters by assisting the states in developing land and water use programs for the coastal zone areas. Financial incentives are offered to states that voluntarily take action in controlling destruction of coastal resources. Federal planning grants originally set-up for three years at 67% now amount to 80% for four years to help states develop management plans for their coastal zones; federal implementation grants are also available once a program has been approved.

The National Oceanic and Atmospheric Administration (NOAA) received authorization to administer the program. By the end of 1976, NOAA had awarded $36.2 million in planning grants to 33 of the 34 coastal states and territories participating in the program. In fiscal year 1977, an additional $6.2 million is being made available. Thus far, only Washington, Oregon and California are proceeding at any reasonable rate towards reaching a CZM planning goal. The majority of states in the program, however, are taking a long

time just to develop basic inventories of the coastal resources. A fundamental problem facing all participants is attempting to involve all the various branches of state, local and federal governments influencing development or protection of coastal areas. This taken alone is no small task but a requirement of the CZMA legislation. Local governments in many states resist having the state or federal government telling them what to do. Further, this is strictly a voluntary program and therefore carries no assurances that management will in fact be undertaken and implemented.

Although nearly five years have elapsed since passage of CZMA, New York State is counted among the laggards in coastal planning in spite of the fact that, to date, NOAA planning grants to the state have amounted to well over $500,000. On the other hand, comprehensive land use planning has never gained very wide support from the majority of New York's residents. Since early history, New Yorkers have zealously upheld and supported the ethic of local control and home rule. Nevertheless, many local governments have themselves been unable or unwilling to adequately deal with land use problems whether they relate to land or water. Local leaders, special interests and private residents as well view comprehensive land use planning as a usurpation of individual property rights and an infringement upon one's right to make a profit.

In the 1977 session of the New York State Legislature, it is anticipated that a bill for coastal zone management will be proposed as part of an effort to promote statewide planning for protection of coastal resources. However, this is not the first such bill to reach the floor of the State Houses. In 1974, Senator Bernard Smith introduced what

became an extremely unpopular piece of legislation which left an impression upon many local and state governmental leaders. As a result of this, the new proposal has been written to provide for local control of coastal zone management at the town level in order to gain a broader base of support. While many leaders have indicated concern over the uncontrolled industrial and commercial development in critical areas, they lack the technological, financial or managerial resources necessary to adequately contend with these aggravated problems. Further, thus far State government has been unable to provide any leadership to a comprehensive planning framework.

Perhaps the most notable effort to displace this home rule ethic was an unsuccessful attempt in the executive office under the strong tutelage of Governor Nelson Rockefeller when he established the Office of Planning Coordination (OPC) in 1966. OPC was charged with "restructuring the planning and land use control laws; acting as a watchdog over state agencies' spending and performance; and working with local units of government on land use planning activities. The group's first major task was to undertake a statewide land use and natural resources inventory which took nearly four years to complete and cost approximately $750,000. In 1970, OPC proposed a study bill known as Senate Bill 9028 which would have required each level of government to produce a long range plan that would be reviewed for compatibility with the state plan. The state control agency was to be a seven man board in Albany. Reactions to SB 9028 were generally negative since many viewed it as moving zoning powers to higher levels of government and into the hands of professionals. As a result it never went to committee. In 1971, the Legislature cut OPC's budget by 60%, changed its name to the Office of Planning Services (OPS) and reduced its authority to that of assisting local government in planning activities. The final blow came in April 1975 when OPS was abolished and

since that time planning functions for New York State have been carried-out in the Planning Division of the Secretary of State.

Every year since 1971 legislation similar to SB 9028 concerned with the concept of a strong, vigorous state land use planning agency has been introduced into the Legislature, albeit unsuccessful. It isn't clear exactly where the base of support will be sustained when New York's second proposal for Coastal Zone Management is introduced into the 1977 session.

Comprehensive land use or coastal zone planning provides an opportunity to observe an entire state as a whole and learn how the various parts interact and impact upon each other. Every segment of the environment is part of an entity, a natural system which goes beyond local and state jurisdictional boundaries. Proponents of statewide planning view New York's failures to accept a comprehensive plan as an abdiction of responsibility to this and to future generations in deference to special interests seeking economic advantage.

While this criticism of the State's efforts may be justified, it is also true that alternative institutional arrangements are operating in New York, some more successful than others, dealing with environmental issues but in a segmented fashion. Segmented in this instance referring to individual problems such as Flood Plain Management, Tidal Wetlands Protection, Stream Protection, State Environmental Review and so on, as well as jurisdictional segmentation such as Regional Planning and the Adirondack Park Agency. Some consideration must be accorded the fact that a central guiding thread of American constitutional government development has been the evolution of a political system in which all active and legitimate groups in the population can make themselves heard at

some crucial stage in the decision-making process. This is a markedly decentralized system and decisions are made by endless bargaining.

Subsequently, a model of democracy has evolved in the U.S. which is comprised of a myriad of small interest groups having widely differing power bases and undertaking a multitude of strategies on decisions salient to them. In this "pluralistic" model, no single power elite dominates the full spectrum of decision-making. Instead there is a relatively wide sharing of power among leaders and groups tending to specialize in one or a few areas.

However, in more recent times, advances in science and technology have proceeded at a pace that dramatically exceeds comparable advance in our political system. Government seems unable to respond to or anticipate the technical and logistical externalities of scientific advancement. What's more, the growing complexity and importance of resource problems demand joint and coordinated action at all levels of government in planning and development of policies. However, in order for this to occur there must be strong and perceptive leadership emanating from the Federal and State administration, with an awareness of historical biases and vested interests. Given the peculiar historical and political constraints that exist in New York with its approximately 1600 units of local government, it may be that the segmented approach for the most part has the potential to be most successful in achieving comprehensive planning with the least amount of political conflict, economic and social disruption.

The present New York State Department of Environmental Conservation was the design originally of former Governor Rockefeller, a strong executive who combined the Conservation Department, Water Resources Commission and Natural Beauty Commission

plus certain functions of the Department of Health, Air Pollution Board, Pesticide Control Board and the Department of Agriculture and Markets into what can be characterized as an environmental "super-department." In 1970, a general complaint had surfaced in New York as well as all over the U.S. that various governmental agencies at all levels were unable to appropriately respond to new social needs. A reorganization was viewed as a way to underscore the political importance of pollution control and the focusing of public and legislative support on environmental issues. Among the justifications given for the move was that it created a stronger regulatory role for the state, would make policy-makers more responsive to elected leaders and the public and would increase accountability of public officials. This reorganization and integration of 2,700 staff included a melange of technicians, sanitary engineers, biologists, scientists, conservationists and a plethora of bureaucrats. A single department director would identify one source that could be held responsible, making state environmental activities more accountable to the Governor, the Legislature and the voters.

In October of 1972, Congress overrode a presidential veto and enacted Public Law 92-500, the Federal Water Pollution Control Act Amendments of 1972. The Act's objective was the restoration and maintenance of the "chemical, physical and biological integrity of the nation's waters" and to attain the goals of fishable and swimmable waters by 1983. The Environmental Protection Agency (EPA) was given primary administrative responsibility under the Act. The 1972 Amendments established the control of point source discharges as the number 1 priority of federal and state governments. The Act further recognized the importance of controlling non-point sources of pollution as well.

In New York, DEC is the lead agency for carrying out requirements of PL 92-500.

One of the agency's major tasks has been to undertake a statewide basin water quality planning effort in order to present an up-to-date report on pollution problems, treatment needs, priorities, schedules for pollution abatement and rule setting for state and federal grants-in-aid for future treatment works and all permits issued under the National and State Pollutant Discharge Elimination System. For example, DEC recently completed a basin water quality plan for Long Island, New York City and coastal Westchester County. This is being followed-up with $14 million in much more detailed water quality planning efforts in these same areas under Section 208 of PL 92-500 pertaining to non-point sources which when completed and approved, will be incorporated into the statewide plan.

Since the coming of Earth Day in 1970 and the overwhelming public outcry against environmental pollution, several pieces of protective legislation have been passed in New York giving DEC a broad regulatory and planning authority. Further, the passage of PL 92-500 and subsequent implementation of policy guidelines and planning suggests to some degree that the State is engaged in a form of land use planning. Depending upon the perception of New Yorkers to this view, it may have some bearing upon the speed and ease with which coastal zone management will become a reality.

A sample of the recent environmental legislation follows:

State Wild, Scenic and Recreational River Systems - effective 1972

This law made DEC responsible for establishing and administering a statewide system to protect rivers with outstanding natural, scenic, historic, ecological and recreational values that lie outside the boundaries of the Adirondack Park, and for those within the Adirondack Park owned by the State.

Floodplain Protection - efective 1974

Each community that received notification from U.S. Housing and Urban Development of flood prone status must prepare adequate flood controls assisted by DEC.

Tidal Wetlands Protection - effective 1973

To preserve and protect tidal wetlands, and to prevent their despoilation and destruction, giving due consideration to the reasonable economic and social development of the State. The Law requires an inventory of all tidal wetlands and the adoption of permanent land use regulations by DEC.

Freshwater Wetlands Protection - effective September 1975

This law, when fully implemented will regulate between one to two percent of the State's total land area, heavily concentrated in areas such as the shorelines of Lake Ontario in Oswego County. It is the freshwater counterpart of tidal wetlands.

Stream Protection - effective 1966

The Law requires a DEC permit for:

(l) changing or disturbing the course of, or removing sand, gravel, or other material from the bed or banks of any stream
(2) erection, reconstruction or repair of any dam or impoundment structure as well as any dock, pier, wharf or landing structure along any stream or watercourse.
(3) excavation or placement of fill in navigable waters, or in marshes, estuaries, tidal marshes and wetlands adjacent and contiguous at any point to navigable waters that are inundated at mean high water level or tide.

State Environmental Quality Review - effective June 1976

Requires an Environmental Impact Statement (EIS) for any project undertaken by State and Local government agencies or any project financed and/or permitted by any government agency which is determined to have a significant environmental affect.

Environmental Quality Bond - effective 1972

State investments to ensure quality water, air and land resources.

Mined Land Reclamation Law - effective 1975

All operators engaged in mining activities must obtain a permit from DEC.

Solid Waste Disposal - effective 1973

Authorized DEC to promulgate rules and regulations governing the operation of solid waste management facilities as well as to cooperate with local units of government and provide technical assistance. The intent of the law is to regulate both existing landfills and newly constructed ones.

Other Environmental Legislation (Land Use)

Conservation Farm Plan - effective 1976

Requires that by January 1, 1978 every owner or occupier of agricultural land to have applied for a soil and water conservation plan to the appropriate conservation district.

Local Acquisition of Open Space Areas - effective 1960

Declares the acquisition of open space, including farmland to be a public purpose. Authorizes any county or municipality to acquire by purchase, gift, grant, bequest, devise, lease or otherwise open space areas by fee simple purchase or any lesser interest including easements, convenants, development rights or any other contractual right that the involved parties may agree to.

Suffolk County's Development Rights Purchase Program - effective 1975

Authorizes the expenditure of county funds for purchase of development rights in farmland.

Study Proposals

Acquisition of Scenic Easements

Proposals are under study to grant condemnation powers to any governmental or private agency now armed with eminent domain authority for purposes of acquiring scenic easements.

Citizen Suits

Demands are being made to allow any citizen, even though not the damaged party, to bring suit against a person for violation of existing laws.

Coastal Zone Management

Earlier described.

Critics of environmental regulations that pertain to land use regulation maintain that the State already has too much regulatory and planning authority. Environmental interests on the other hand claim that the laws are not adequately implemented either at local or state levels. Both of these positions bear equal consideration. While it is

recognized that most of the legislation on the books doesnotdeal with coastal zones as a separate and distinct entity, it is hard to imagine that Coastal Zone Management will receive approval in the near future. There are some positive measures which can be implemented given the existing authority and available resources.

Some Examples from Long Island

Agriculture in many instances may be one of the most desirable uses of coastal lands from the standpoint of preservation of the environment; however, severe pollution problems are known to exist even in this sector. An interesting illustration is that of Long Island which has long experienced conflicts that typify contemporary coastal concerns. What was once a highly productive agricultural region is now a haven for millions working in the metropolitan areas. While Nassau County appears to have reached a population peak, Suffolk has been of the the most rapidly expanding counties. Its population rose from around 161,000 to 1,200,000 in some forty years, with 92% of the population settling in Western Suffolk. There is some evidence to suggest a slowing of this trend recently due to the energy crisis and inflation related issues. While agriculture is still economically important, it is often in serious conflict with existing and potential land use alternatives. Long Island is a region where land use and uses of groundwater, surface and ocean waters often come into conflict. For this conflict to be resolved, appropriate consideration is required of the several millions of people who live there,within the limits of technology, financial resources and the assimilative capacity of the environment.

Among the most serious resource issues are those relating to groundwater which is the sole source of water supply for Nassau and Suffolk Counties. Septic tanks have

been the popular method of domestic wastewater and sewage treatment for thousands of homes. However, in many areas, these systems are responsible for build-up of nitrates, detergents, and bacterial contamination of the vital ground water resources. On the other hand, if all the houses were sewered with advanced waste treatment, a quantity of water would not be returned to ground water reservoirs. There is a vast array of potential alternatives but in order for this conflict to be adequately resolved, careful examination must be made of the advantages and disadvantages of each.

Currently, a program of wastewater treatment and groundwater recharge is one alternative being investigated through 208 planning with the DEC. Such a program would include collection of wastewater, advanced waste treatment and disposal to the groundwater reservoir through recharge wells. Auxiliary bay discharges or ocean disposal would be used during wet seasons or during emergency periods. Treatment plants and outfalls are being designed to accommodate this potential.

In a program to test the quality of well water, the Suffolk County Department of Environmental Control found that a number showed nitrate levels well above the 10 parts per million used as the public health standard for drinking water. Domestic sewage from residences, fertilized farm fields and fertilization of residential, institutional and recreational turfgrasses are the most likely sources of nitrate pollution in groundwater supplies. The County is supporting research to halt this build-up of nitrates and in cooperation with Cornell University researchers hopes to develop alternative fertilizer recommendations meant to reduce leaching to acceptable levels without hurting crop yields and turfgrass quality.

Alternative Land Uses

The number one agricultural county in New York State is Suffolk with a total gross sales of all agricultural products in 1972 exceeding $80 million; the multiplier effect of this is estimated to be around 2.5 to 3.0 times that much. The County leads the State in production of potatoes, nursery products, ducks, sod and flowers. There are currently about 725 farms producing on 60,000 acres. This is less than half the acres in production in 1950; most farms in western townships have been converted to residential subdivisions.

Over 50% of the farmlands are currently owned by non-farmers, including retired farmers and investors. The full market value of farmland is estimated to range from about $5,000 per acre in the eastern townships upwards to as high as $30,000 per acre in the western areas of the county. The agricultural value is estimated to range from $1,000 to $1,500 per acre.

Sometime in 1972, the County Executive became alarmed about the rapidly dwindling acreage of farmland and created an Agricultural Advisory Committee to study ways of reversing this trend. Considering the unique set of economic, social and environmental factors associated with Suffolk's farmlands, the Committee recommended the purchase by the county of development rights. The following quotes are from Newton.

Basic concepts of development rights are as follows. "The ownership of land carries with it certain rights to make 'improvements' of the land consistent with government regulations. These rights to improve or develop land constitute a part of the total package of interests and rights referred to as development rights. The county's program calls for the purchase of these rights of about 12,000 to 15,000 acres of prime agricultural cropland."

"The owner in selling the development rights, retains the rights of ownership and possession, plus the right to use and sell the land solely for agricultural purposes. The county upon acquisition of the development rights, intends to retain them in perpetuity."

"The underlying assumption of the program is that the acquisition of development rights of approximately 20% of the farmland will stimulate reinvestment in agriculture and encourage other farmland owners who do not participate in the program to continue their land in agricultural production."

As of September 1976, the Suffolk County Legislature had authorized purchase of development rights on approximately 3,900 acres of cropland totaling $21 million. There are plans to extend this acreage to 15,000 acres through 1979 but with increased pressures from budget cuts and inflation, it is possible that this goal will not be met.

Suffolk County has better than 250,000 acres of land having development possibilities; this figure includes farmland. Most of the land is zoned residential with a minimum lot size of one acre precluding growth in high densities. Recent changes in rural zoning regulations of more rural areas have increased minimum residential lot size from one to two acres. This trend is also seen in some of the county's eastern towns. Further, there are local building height restrictions which preclude construction of unsightly high rises.

Pollution Abatement in the Duck Industry

The one agricultural activity achieving possibly the greatest degree of notor_ty on Long Island's coast is the duck industry which traces its origins back to 1824. The majority are located in the Eastport and Moriches area on some 1000 acres. Historically, shore areas have been the principal location of duck farms providing sandy shorelines,

an abundance of fresh water and moderating climates. Under the old management philosophy, it was thought that ducks should have direct access to water in order to produce high quality meat and feathers which sold as a byproduct; access to water also meant a convenient system for flushing of wastes. As a result, the industry was allowed to degrade the coastal environment surrounding it as well as the environment within which it operated. Portions of open waters were fenced-off to provide areas in which ducks could swim. The uncontrolled discharge of duck wastewater to the waters surrounding the shore of Long Island caused water pollution problems that included high coliform densities, BOD and phosphorus concentrations in the offshore waters. The resulting decline of the oyster industry in Moriches and Great South Bay was directly correlated with increases in a dominant alga which differs greatly from the flora typical of the area.

At the present time, many commercial duck farmers on Long Island, under the close scrutiny of DEC, operate sophisticated tertiary sewage treatment facilities entirely built and maintained by operators for all animal and processing wastes. Producers now dike or divert surface or ground water from open waters to supply swimming areas for the birds and to facilitate the controlled wastewater treatment and disposal system. Previously, considerable quantities of water, up to 100 gallons per duck per day, were used from groundwater supplies; current usage averages approximately 6 to 10 gallons per duck per day as producers have sought to minimize waste flows. Other farmers have turned to "dry farming" techniques to avoid the cost of treatment. Dry farming uses minimum of water and there is no direct discharge of wastes to surface waters.

In 1965, some 8 million ducks were produced in Suffolk County. Although the number of duck farms has decreased steadily over the past quarter century, county farms raise more than 5 million ducklings on about 1000 acres with an estimated value

of some $15,000,000. Land prices continue to escalate and the treatment of wastes is costly.

The duck industry is an important part of the Island economy today as it was in years past, employing several hundred unskilled workers. Because of this economic importance, duck farmers were an extremely influential and powerful group such that they were able to successfully supplant moves to interfere with industry operation. In the early 60's, there was as yet only small public concern for the environment and no recognition of the problem by duck farmers. In the late 60's however, under New York State's Clean Waters Program, court orders were issued mandating the installation of water treatment systems. Subsequent Federal as well as State regulations have forced farmers to install an on-farm duck waste treatment facility ranging in price from $50,000 to $100,000. Systems are continuously monitored with farmers contributing $1,000 each per year towards this effort. If there is non-compliance, heavy fines are imposed by DEC. Some farmers simply chose to retire from duck farming and sold their land.

Reportedly, much of the waste which had settled to shore bottoms has been carried out to sea and dissolved; eventually that which settled in bay areas will do likewise. As early as 1972-73, fisherman and boaters of the Riverhead area began to recognize improved recreational fishing as well as improvements to shell-fishing resources. Many attributed this to the efforts of duck farmers. Some duck producers express gratification at having been forced to comply with water quality standards.

Unfortunately, the future is not very promising for Long Island duck farmers. Practically all inputs to the industry must be imported from outside the Island; this is particularly critical for feed which must be shipped in from upstate sources. Land

prices continue to escalate and the treatment of wastes is costly. Ducks are now being produced in the Great Lakes Region and in the South where land is available for the raising of crops. While all duck farmers are subject to the same environmental constraints as New York producers, the comparative advantage of raising ducks seems to be slipping away. Predictions have it that within the next ten years, duck farming on Long Island will be an enterprise of the past.

One can only speculate on what alternative use will be made of the 1000 acres currently devoted to duck farming, producing $15 million revenue or $15,000 per acre. Flowers and bedding plants currently generate $11,000 per acre so it may well be a shift to more horticulture products as an alternative use of this land, and with appropriate safeguards on regulation of fertilizer-pesticides continued to ensure that the coastal area benefits from a shift away from duck farming.

The Regional Planning Effort

Planning representatives from Nassau and Suffolk Counties comprise the Bi-county Regional Planning Board. The Board has long concerned itself with land use planning and water quality problems existing on Long Island. More recently, it has become involved with areawide waste management planning as a function of Section 208 of the Federal Water Pollution Control Act Amendments of 1972. A grant of $5.2 million was received to develop a work plan encompassing the following objectives:

(1) to determine the probable response of ground and surface water/wastewater management alternatives,

(2) to identify significant point and non-point pollution sources,

(3) to identify, rank and select a feasible mix of technical and land use alternatives capable of achieving specific management objectives,

(4) to determine the usefulness of land management and land use practices as offsets to facilities investments,

(5) to determine the most cost-effective program incorporating technical and non-structural responses to specific water management objectives,

(6) to develop a facilities plan with at least a 20 year horizon and with an initial 5-year capital program,

(7) to develop a legal and administrative program to carry out the plan.

An integral part of the 208 planning effort is a citizen advisory board. The management is current in final planning stages.

In addition to its 208 work, the Bi-county Planning Board also received a share of NOAA CZM planning money and has undertaken a coastal zone management study with specific objectives.

(1) to reduce shoreline destruction and erosion,

(2) to preserve and protect water resources,

(3) to preserve and protect the natural resources of the coastal zone,

(4) to preserve, protect and restore areas of historical and cultural significance,

(5) to enable the public to enjoy the amenities that coastal zones offer,

(6) to provide for compatible water-related uses in coastal zones,

(7) to preserve, protect and develop regional infrastructure sites (dredging projects, power plants, port facilities, etc.) necessary for and related to coastal zone,

(8) develop coastal resources to maximize public benefit while minimizing environmental damage,

(9) restore and enhance downgraded natural and developed portions of coast.

The Coastal Zone Management Study and the Water Quality Study are very much interrelated, representing a commendable, cooperative effort on the parts of Suffolk and Nassau Counties. The real test, of course, comes in plan implementation as it relates to over 100 units of local government having jurisdiction on Long Island. Various other agencies in the planning area have also been involved in the design for the future including

regional, county and local agencies, the Tri-State Regional Planning Commission, Interstate Sanitation Commission, Marine Resources Council, Regional Plan Association, Metropolitan Regional Council and the Intergovernmental Planning Coordinating Committee.

Long Island appears to be well-ahead of other areas in New York in terms of land use planning measures. Obviously, the responsible agencies and individuals involved have recognized the importance of the coastal and inland interrelationships at work on and adjacent to Long Island.

Summary

State land use controls are not favorably viewed among New York's leaders and residents. However, there is a strong state regulatory agency authorized to implement the numerous environmental regulations under its jurisdiction and it has so been doing. Some New Yorkers view this agency role as that of a planning function which already exceeds its authority. Given this general perception, it will be no small task to legislate comprehensive Coastal Zone Management.

On the other hand, some regions are far ahead of others in a CZM effort. If the planning effort in a given CZM area is a coordinated, cooperative one such as that which obtains in Long Island, segmentation may be the only reasonable alternative for New York's Coastal Plan.

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RESOURCE CONSIDERATIONS

IN COASTAL ZONE

MANAGEMENT

PUBLIC BEACHES ???

MUNICIPAL EXCLUSIONARY PRACTICES AND PUBLIC RIGHTS

by

Sally West

PUBLIC BEACHES ???
MUNICIPAL EXCLUSIONARY PRACTICES AND PUBLIC RIGHTS

Sally West

With the realization that recreation opportunities are rapidly growing beyond the reach of significant segments of the population, the availability of these opportunities is becoming an increasingly important social and political issue. The problem is basically one of high demand and dimishing supply, complicated by economic and political factors.

Among the nation's recreational resources, beaches are illustrative of this problem. Beaches, as unique resources, are limited in supply. The total beach acreage available to Americans is decreasing as more oceanfront property is transferred into private hands, and water quality is degraded by oil spills, industrial and municipal effluent and agricultural runoff. The beaches remaining for public use that are not polluted, crowded or closed, amount to only 1,200 miles, or 5% of the total national coastal zone.[1] Only half of this total is in recreational beaches.[2]

Closely intertwined with the problem of dimishing supply is increased demand. The nation's population has grown rapidly in recent years, from 180 million in 1960 to an estimated 230 million in 1976.[3] These individuals are, for the most part, affluent, have more leisure time, and are more mobile as the following chart suggests.

	1960	1970	2000	Change 1960 - 2000
Population (M)	180	230	350	+170
GNP ($8)	503	1,018	2,007	+1,504
Per capita disposable income	1,970	2,900	4,100	+2,130
Hours work/week	39	36	32	-7
Paid vac. - wks.	2.0	2.8	3.9	+1.9
Per capita miles intercity travel	4,170	6,950	11,000	+6,830

Source: Richard Goldman, "Access to Public Beaches: The Formulation of a Comprehensive Legal Approach." 7 Suffolk L. Rev. 936.

The data presented above are average per capita estimates. It does not follow that all individuals will have a rise in income or become more mobile. Indeed, those most in need of inexpensive proximate recreational outlets are the inner city poor.

In general, for most individuals, poor and more affluent alike, physical access is not a major obstacle. Most of the great population centers in this country are on the coast or within one hour's travel. The problem stems from the fact that alternative and more lucrative uses are competing for oceanfront land. These competing forces -- industry, residential development, private clubs, etc. -- have been able to shut out public recreational uses in many instances because they have a preeminent place in the resource allocation system that rests on the traditional market and political systems. These traditional systems are, however, ill-suited to the allocation of beachland for public recreational uses.

The private market system sets a value on a product or resource through pricing. Unlike a piece of real estate, it is difficult to set a price on recreation, and as conflicts

affecting natural resources indicate, no one really bothers to try. Since there is no effective articulation of public recreation value, beach resources are over-allocated to those uses where there are value expressions.[4] These are such uses as capital-intensive development and private recreation. Thus, the market naturally allocates resources to the highest bidder.

The political process, unlike the market, should ideally serve the diffuse public interest and intervene to provent gross misallocation. However, the political system tends to be more responsive to concerted special interests than to a diffuse public which does not articulate demands.

Government at all levels, but especially local government, is subject to political and economic pressures, and public recreation becomes of secondary importance when an opportunity to increase the tax base presents itself. Another serious problem is that issues in resource allocation transcend local and state boundaries, but the responsibility to deal with them has been fixed at the local level due to the pervasive home rule concept and other factors. Thus municipalities in possession of scarce resources have a tendency to use their jurisdictional powers on behalf of purely local objectives, while overall regional needs suffer. This should be balanced by the fact that people living in area affected by a regional facility also have rights.

The political and market systems have combined to exacerbate the problem of beach access. One manifestation of the inadequacy of the present system is public exclusion from municipally-owned beaches. As more beaches are relegated to other uses, or made unsuitable for recreational use, pressures on the remaining beaches increase. Many beachfront municipalities have reacted defensively to protect their beaches from overuse by attempting to discourage non-resident use.

Many shoreline communities have banned non-residents all together. These bans are enforced through a network of bumper stickers, parking regulations, ID tags, etc., which are available only to local residents at nominal fees. Those municipalities which allow non-residents to use their beaches have instituted exorbitant and discriminatory fee schedules. For example, in Connecticut, the Town of Westport's beach is open to residents for an $8.00 sticker fee. Residents of nearby Weston must pay $40.00 for the use of the beach.[5] On the other hand, residents of Westport may have already supported the provision of this facility through tax payments.

In Long Beach, Long Island, it has been estimated that the discriminatory fee schedule presently in use would force a non-resident family of four to pay $264 for the use of the beach during the two-month summer season.[6]

The Village of Oyster Bay in Nassau County has seven beaches. Two are open to residents only, while two are open to non-resident use on weekdays and three allow non-residents on weekends -- for a $4.00 daily fee.[7]

In Shelter Island, Suffolk County, the required parking stickers are available to residents only. In Amagansett, a stickerless car on the beach can be fined $15.00, while an Amagansett sticker car on an East Hampton beach can be towed.[8]

The municipalities justify their exclusionary practices by pointing to the home rule prerogative, facility carrying capacity, local taxpayer rights, and solving parking problems.[9] Those who oppose the residential restrictions argue that the use of beaches is a public right. Further, many of the beaches in question have been purchased and/or maintained with state and federal funds.

Although these practices of discouraging non-resident use of municipal beaches have been in existence since the mid-1950's, it is only in the last few years that restrictive ordinances have come under legal attack from private individuals and, in one case, by a neighboring municipality.

There are three primary cases involving judicial review of municipally-restricted beaches which will be analyzed. Two of these cases, Gerwirtz v. City of Long Beach and Borough of Neptune City v. Borough of Avon-by-the-Sea, were decided on common-law principles, while the third, Brindley v. Lavallette, was based on the equal protection clause of the Constitution.

Additional cases clarifying applicable theories of common-law will be presented. Only a brief consideration of the constitutional aspects of beach exclusion will be given, principally because Brindley alone has been argued from that standpoint. The courts are currently placing more emphasis on use of the common-law. Constitutional arguments, however, may increase in importance as the American Civil Liberties Union becomes more involved with questions of beach exclusion.

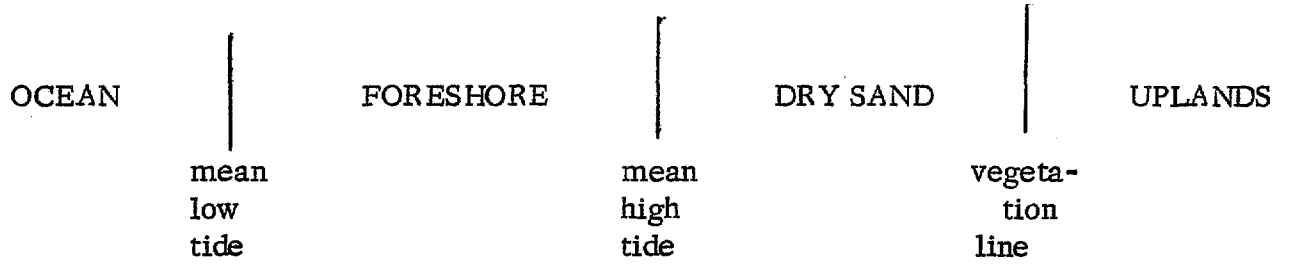
The immediate legal issue in these cases of restricted beaches centers on whether a community has the power to deny to non-residents the use of publicly-owned beaches, either through complete restriction or through unreasonable differential fees.

The causes underlying the phenomenon of closed public beaches do not lend themselves to judicial solution, however. The problems are a complex mix of market forces, political fragmentation and jurisdictional squabbling, environmental issues, etc. They involve more than beaches. The entire coastal zone is the area of concern. These are questions of public policy which must be dealt with from a legislative and regional planning standpoint. At the present time, however, few sane mechanisms for coastal resource

allocation exist, and those that are in existence are under attack. The California Coastal Zone Conservation Act is an example.[10] It is beyond the scope of this paper to analyze these underlying issues, since the immediate problem at hand is the legality of beach restrictions. It is important, however, to be aware that the restrictions are only symptoms of more fundamental problems.

The Legal Geography of Beaches

The traditional common-law of the seashore subdivides the beach into three physical zones, each having its own special legal definition with regard to public rights of access. They are the foreshore, the dry sand, and the uplands. The following diagram shows these boundaries.



Source: Goldman, p. 94ln.

American concepts of public rights and private ownership of tidelands originated in early English common law. In pre-Norman England, sovereign authority over all land was vested in the king and called the jus privatum. After the Norman Conquest, the king extended this authority to the oceans and the submerged lands. The king had the power, since he held title to all lands, to grant title or other exclusive rights in any portion of the seashore to a private party.[13] The use of this power was so extensive that it soon became a source of substantial interference with commercial activities in England's waterways. This interference prompted a shift toward an expansion of public rights in the seashore which the king formally accepted in the Magna Charta.[14]

The New York Supreme Court summarized this new concept of jus publicum in People v. New York and Staten Island Ferry Co.[15]

> Title to lands under tide waters within the realm of England, were, by the common-law, deemed to be vested in the king as a public trust to subserve and protect the public's right to use them as common highways for commerce, trade and intercourse. The king, by virtue of his proprietary interest could grant the soil so that it should become private property, but his grant was subject to the paramount right of public use of navigable waters, which he could neither destroy nor abridge. In every such grant, there was an implied reservation of public rights, so far as it assumed to impede or obstruct navigation, or to make an exclusive appropriation of use of navigable waters, the grant was void.[16]

In Martin v. Waddell,[17] the Supreme Court held that the states, after the Revolution, assumed the title to all lands previously held by the English crown. Thus, the states were also subject to the same restrictions placed in crown lands.

The Public's rights in navigable waters and in the foreshore are well established, and many cases can be cited in support of this contention.[18] Public rights in the dry sand area of the beach and, to a greater degree, in the uplands are vague and limited. Some states, Oregon for example, have recognized the dry sand area to the vegetation line as being held by the state in trust, and therefore open to public use.[19] The uplands above the vegetation line, however, have traditionally been considered private property with the public being allowed only to pass through the uplands to gain access to the sea and foreshore. This right is not absolute. The littoral owner may forbid public crossing of his land to reach the sea if he takes action to post or fence his lands in keeping with certain concepts of dedication.[20]

A serious practical problem presents itself here. From the few brief remarks made above, it is evident that the law does not conceive of the beach, as it is popularly

defined, as a total environment. Recreational uses, however, do not recognize zones. Beaches are used in their entirety. This is the point at which complex legal issues as to private ownership rights and public rights surface.

The judicial process is currently one of the few ways through which the public is gaining access to beaches. The courts have, for the most part, recognized this problem and have begun to reinterpret traditional common law definitions to try to answer the problem of beach use.

Cases Relating to Municipal Beach Access

Current arguments used to fight exclusionary practices on municipal beaches rest on certain ancient common-law principles and definitions of public rights in beach areas. These legal principles are: prescription, dedication, custom, and the public trust.

Prescription

Public rights in beach lands can be acquired through the common-law principle of prescription, which is also the main legal theory behind the creation of public easements.[21] Prescription holds that such an easement can be created through continuous, open and adverse use of the land without permission of the owner.[22]

One Texas case which is illustrative of the theory of prescription is Seaway Co. v. Attorney General.[23] The Seaway Company owned oceanfront acreage on Galvaston Island in the Gulf of Mexico. After purchase of the land, Seaway erected fences above the high water mark which excluded the public from the beach. The Open Beaches Act of 1959 was in force at the time Seaway cordoned off its property. In essence, the Act declared a legislative presumption that the public had a prescriptive right to use the

beach seaward of the vegetation line, and authorized the Attorney General to defend this prescriptive right. The law also established a prescriptive right if the land was in continuous public use for over a 10 year period without objections from the owners. The state brought suit to remove Seaway's barriers since they constituted an infringment of public prescriptive rights in the upland beach area, and were in violation of the Open Beaches Act. The court ruled in favor of the state, finding that the public had made continuous use of the beach for the required 10 year period. It went beyond the stautory provisions, however, to establish a public prescription through continuous use of over 100 years, during which time the public used the beach for recreation and travel without objection by the owner. The court found that a public right existed independent of the 1959 Act.

The theory of prescription is, then, a potentially useful tool to apply to questions of public rights in recreation beaches. As Seaway indicates, it can be used to safeguard public recreational use of the beach in its entirety, dry sand as well as foreshore.

Dedication

Dedication may be defined as the intentional devotion of land by the owner to public use. Dedication necessarily implies an offer which is made and must be accepted to be complete. The offer and the acceptance may be either express or implied.[24] No formalized means of exchange are required, as dedication may be construed from actions.[25] With implied dedication, the owner is deemed to have intent to dedicate if he acts in such a manner as to make the public believe there is a dedication, and if the public acts on that belief by using the land.[26] Following this public acceptance, dedication is complete and is irrevocable.[27] The public cannot lose its rights through non-use.[28]

Dedication differs slightly from prescription in that it requires that intent to dedicate and acceptance of dedication be established. Prescription requires only public use without owner protest.

An early beach access case relying on the dedication theory was F. A. Hihn v. City of Santa Cruz.[29] The landowner, Hihn, brought action to quiet title to an oceanfront parcel of land in Santa Cruz. The city asserted title as successor of California with 20 years adverse use by the city and the public of the area. The beach was used for recreation and park purposes for the benefit of the public. The city had made improvements on the parcel including a roadway and a small park. The court ruled in favor of the city, allowing dedication of a roadway along the beach, but not a dedication of the beach itself.

In sustaining the city's claim to the portion of the parcel containing the esplanade, the court found title by adverse use because "the city went on the land, took possession, erected improvements and rendered the land unfit for anything but a public highway." In deciding the question of the public's rights in the beach itself, the court ruled that "no dedication may be inferred from long acquiescence in use by the public where the land is unenclosed and uncultivated." Thus, a public interest and rights by adverse use seem to be defined by whether the city invested any public funds in the land.

Hihn is interesting because, when compared to later cases, it demonstrates how changing social needs can swing a court's opinion. The Hihn decision reflects a time when more beaches were available and under little recreational pressure because the population was smaller and transportation was poor. The refusal of the court to recognize a public dedication of the beach, therefore, did not deprive large numbers

of individuals of recreational outlets. On the other hand, great importance was attached to unimpeded transportation and commerce.

Recent cases, however, have moved from this early view, and have used the dedication theory to establish public rights in beaches through use.

Two California cases, Dietz v. King and Gion v. City of Santa Cruz[30] were decided in a single opinion, and relied on dedication to allow public access. In the Dietz case, a beach and its access road had been continuously used by the public for 100 years. In 1959, the King family attempted to discontinue its use by the public, and Dietz sued to keep the beach open.

The plaintiff in Gion asked for a ruling which would determine his right to develop three parcels of oceanfront property which had been used by the public for a long period of time and had been maintained by the city for more than five years.

In both cases, the court found that public recreation easements had been created by dedication. The court avoided the problem of intent to dedicate in its decision, however, relying on the fact that the public had behaved as though it perceived an intent to dedicate. The court found in part that:

> . . . common-law dedication of property to the public can be proved either by showing acquiescence of the owner in use of the land under circumspection that negate the idea that the use is under a license or by establishing open and continuous use by the public for the prescriptive period. When dedication by acquiecsence for a period of less than five years is claimed, the owner's actual consent to dedicate must be proved . . . When, on the other hand, a litigant seeks to prove dedication by adverse use, the inquiry shifts from the intent and activities of the owner to the public.[31]

Thus, the California court expanded the idea of public adverse use and placed the burden of proof on the landowner to overcome the apparent fact that the public has

established a right to use the shoreline. Furthermore, it is apparent that the court looks to the character of the property and the extent of public use in determining whether an implied dedication was made.[32] So, it is implied that the importance of the use to the public will play a major role in the final determination.

Gerwirtz v. City of Long Beach[33] is another case which utilized the theory of dedication to open beaches to the public. This case deals specifically with the issue of municipal exclusionary ordinances.

The city acquired title to a portion of the beachfront between 1935 and 1937 by conveyances. Simultaneously with acquisition, the city applied for federal funds for beach and oceanfront improvements, and in 1935, the government issued a commitment for grants and loans subject to the condition that the city would not attempt to limit full and free public use of all navigable waters. In 1936, by enactment of Local Law 4, the city dedicated the beach as a public park and authorized the collection of reasonable fees to persons entering the park. The law did not grant the power to regulate the classes of persons entering the park, nor the power to discriminate among users. In 1970, the City Council amended the 1936 law by enacting Local Law 9 which provided that any person who was not a resident of the city could not use the beach.

The court ruled that the city had the power to dedicate land for public use and in fact had done so in 1936 by making the beach a public park and developing it for the use of the public at large for 30 years. Thus, intent to dedicate on the part of the city was manifest in its official actions of 1936. The court also found that the existence of a differential fee schedule for residents and non-residents suggested that the park was open to all during the 30 years. An irrevocable public dedication had been made.

One writer noted that a logical conclusion drawn from Girwirtz is that the mere fact of maintaining a beach is sufficient to charge any municipality with having accepted its own dedication to the public. Thus, dedication to the public becomes almost a necessary incident of municipal ownership.[34]

The court also based its decision on the public trust doctrine, to be more fully discussed below. The court reasoned that since the city had dedicated the beach as a park to the public, it became a public trust insofar as the public at large was concerned. Therefore, any attempts to divert public park property to other uses would be closely scrutinized and restrained if necessary. A clear and express legislative authorization was needed to change the use of or to sell parkland because the municipality was acting as trustee on behalf of the state. The court held that residents-only restrictions constituted a diversion of use and were, therefore, a violation of the public trust. The city had no legislative authorization, but had acted ultra vires.

Gerwirtz is, on the whole, a good example of the principle of dedication. However, the decision relied very heavily on the facts at hand to prove dedication.

Customary Rights

Custom is defined as a "usage or practice of a people which, by common adoption and acquiescence, and by long and unvarying habit, has become compulsory and has acquired the force of law with respect to the place or subject matter to which it relates."[35] The doctrine of customary rights has not been applied frequently in American law, principally because most courts have too strictly applied the following test:

1. The use must be ancient.
2. The right must be exercised without interruption.
3. The use must be reasonable and peaceable.
4. The boundaries of the use must be certain.
5. The custom must be obligatory and not inconsistant with other customs or laws.[36]

The courts have felt that the United States had not been in existence long enough to establish an immemorial use. The case illustrative of the use of customary rights is State ex. rel. Thornton v. Hay.[37]

Thornton involved a suit brought by the state against a motel owner who had fenced off part of the beach to which he held title between the sixteen foot contour elevation line and the ordinary high tide mark. The Oregon Supreme Court held that the owner had no right to erect the fences because public rights in the dry sand area were contained in the legal description of the property, and the state can prevent the owner from closing the area. The public had enjoyed an uninhibited use of the beaches throughout the state's history, and this was sufficient to create a customary right of recreation which precluded exclusion.

The court found that the dry sand area of the beach had been enjoyed by the public under the claim of right as an adjunct of the tidelands since the start of the state's political history. This usage was, then, ancient and constituted a valid custom. Thornton expands the geographical scope of traditional English law to include dry sand for public recreation uses.

Public Trust

While the decisions discussed above relied primarily on the theories of prescription, custom and dedication to open the beaches, they also relied to some extent on the public trust doctrine. The public trust doctrine has great potential as a tool for combating exclusion. Unlike the three earlier doctrines, public trust does not require showings of intent or continuous and adverse use.

At this point, it is necessary to digress slightly. Legal theoreticians often do

not clearly distinguish between the jus publicum, discussed above, and the public trust. The distinction is quite important for the purposes of this paper. The jus publicum and public trust are distinct doctrines although their objectives and applications overlap to some extent. At the core of both is the principle that certain lands are owned and administered by the state or municipal governments as trustee on behalf of the general public. They must be administered for the benefit of the whole public and not limited to some segment.[38]

Application of the jus publicum is confined to the foreshore and navigable waters. Unless it is specifically provided for in the conveyance, private title does not go to the low water mark, and the state maintains ownership of the foreshore beach. Even in cases where the original grant included the foreshore, it is still impressed with the jus publicum and public rights of use are guaranteed.

The public trust is a more general version of jus publicum. The basic principle here is that some property rights in certain lands can never be alienated from the public. It application is, then, broader than jus publicum in scope because it includes lands other than the foreshore.[39]

The main difficulties with the public trust doctrine are that it lacks the clear historical precedents of jus publicum and that there is no uniform interpretation.[40] It is, therefore, a generally imprecise doctrine. Furthermore, a historical overview of the public trust doctrine reveals that its application is entirely dependent upon the socio-economic conditions existing at the time in the jurisdiction where it is enforced.[41] However, it seems significant that the courts have tended to move to the public trust rather than jus publicum in the following decisions because it will allow greater freedom of interpretation.

Various rationales have been offered for use of the public trust doctrine, but at the center is the concept that "certain interests are so intrinsically important to every citizen that their free availability tends to make the society as one of citizens rather than serfs."[42] Among these rationales for the public trust are:

1. To protect the public's rights in certain resources, property rights in these resources must be vested in the general public and not controlled by any particular group or individual;

2. Those interests that are gifts of nature should be reserved for all the people; and

3. Certain lands are public in nature and therefore should be kept available for the general public.[43]

It appears from this list of rationales that beaches, as whole environments, can be classified as having intrinsic social importance. They are basically public in nature. Unlike other public open spaces -- urban parks, etc. -- beaches provide alternative modes of recreation for many different people in addition to having added dimensions of being aesthetic, historical and scenic resources which are not generally available in other places. They are also scarce, irreplaceable and socially-valuable natural resources.[44] Thus, beaches should necessarily be considered as a public resource within the meaning of the public trust doctrine.

There are three general restrictions on governmental activities in public trust lands: first, the property subject to trust must not only be used for public purposes, but it must be held available for use by the general public. Second, the property must not be sold or alienated from the public. Finally, the property must be maintained for particular types of uses, either recognized traditional uses or uses in keeping with the general character of the resource.[45]

Joseph Sax outlines several legal tests to be applied in public trust cases where the public is denied its rights in trust lands because an organized minority exercises undue influence on a public resource to the exclusion of the majority.[46] The public trust and beach exclusion cases discussed below fit into this mold. In each case, the unorganized public majority found its trust rights alienated by a railroad in one case and by an oceanfront municipality in another.

The questions the courts asked in each of these cases centered around the problem of whether the government activity had deprived the public unduly. The courts are concerned with whether the government has granted special privileges to some private interests.[47] The court also considers whether there has been an attempt to reallocate public resources to private users or to public users which have less breadth. Here, the courts are suspicious of an act infringing on public use because it is possible that the decision was made without adequate representation for the public.[48]

No discussion of the evolution of the public trust doctrine as a tool to protect the public interest in a common resource can ignore Illinois Central Railroad v. Illinois.[49] It is perhaps one of the most decisive cases in public trust law.

In Illinois Central, the state legislature had made a grant to the railroad of submerged lands under Chicago Harbor so it could expand its capacity. The railroad had the right to construct any harbor, wharves, warehouses, etc., that it needed. The railroad's gradual expansion began to interfere with public navigation, and the state moved to reconfirm its rights to control the lands on the lake.

The central issues in the case were the power of the legislature to convey title to public lands to private ownership, and the measure of control retained by the state which would limit the grantee in the use of these lands to preserve the public right of access.

The Supreme Court ruled against the railroad, holding the grant invalid because the state had divested itself of general regulatory powers over a matter of great public importance, in this case, navigation. The Court did not actually prohibit disposition of public trust lands to private individuals, however, it pointed out that the state may not abdicate its responsibility to govern the whole of the area. The decision recognized that although tidelands could be granted to private parties by a state, any such grant would always be subject to the public trust.

According to the Court, trust is governmental in nature, and cannot be alienated by the government except in cases where the land is used in the improvement of the public trust, and when the land could be disposed of without detriment to the public interest, or without detriment to the public interest in the remaining lands. The Court did not find the legislature's grant to Illinois Central to be consistent with these limitations. The Court emphasized that title to soils under navigable waters held by the state is unique and unlike any other state-held land because "it is a title held in trust for the people of the state. . .freed from obstruction or interference of private parties." Therefore, the Court determined that the character of state control is such that it has special regulatory obligations over shorelands which are inconsistent with largescale private ownership.[50]

Illinois Central, while not specifically concerned with public beach recreational opportunities, nonetheless has important ramifications for the problem of beach access. The case established that a state may delegate control over public trust lands to a municipality or other body, but there always remains with the state the right to revoke them in a more direct manner.[51] Thus, the state remains primary trustee and has an obligation to protect the public interest. In connection with the problem of municipal

beach exclusion regulations, the state, according to Illinois Central has the power to remove control of a closed beach from a municipality and assume responsibility for its maintenance, open to the public.

Secondly, the decision sets forth a principle of interpretation which is central in public trust litigation. That is, when a state holds a resource which is available for the free use of the general public, the court will look with skepticism upon any governmental action which is calculated to reallocate the resource to more restricted uses, or to give private parties superior rights to the public.[52] This narrowing of use is indeed the case with beach exclusion practices. Illinois Central, then, establishes a precedent for careful judicial scrutiny of regulations that diminish public access to lands held in the public trust.

Other state courts have acted to limit the activities of local governments which have infringed on the public's enjoyment of public trust lands. In City of Madison v. Tolzmann,[53] the Wisconsin Court presents a very pertinent decision regarding municipal regulations of a public recreation resource by a licensing procedure. Madison claimed that legislation establishing the city gave it jurisdiction over lakes within its boundaries, and enacted an ordinance requiring that any boat operating on its lake waters be registered and obtain an annual license. Tolzmann was fined by the city for operating his boat without such a license.

The court overturned the ordinance on several counts. First, it found that cities are creature of the state "to assist in civil government of the state and to regulate and administer internal or local affairs of the territory within their limits." Thus, they have only those powers expressly granted by the state, and others which are necessary for the exercise of powers expressly granted. The court could not find any express

authorization for a licensing fee. The city had argued that such authorization stemmed from the home rule amendment to the Wisconsin Constitution. The court, however, decided that this amendment applied only to local affairs and not those of state-wide concern.

The court then proceeded to analyze the nature of the public trust in navigable waters. It found that by reference to the common-law, navigable waters were impressed with the public trust, and that their free and unobstructed use was a matter of statewide concern. The court then took a very important step by broadening the scope of uses of navigable waters to include pleasure boating -- recreation. It further argued that the state may delegate its trusteeship authority, but the state remained trustee for all the people.

Finally, the Wisconsin court applied the ruling in Brooklyn Center v. Rippon[54] that licensing and regulation were of essentially different characters. It held that a regulation applies equally to all individuals, while a license gives an individual a special privilege not accorded to others which he would not otherwise be able to enjoy. Thus, licensing may not be used as a regulatory tool for enforcing safety, in a public trust area, since it is discriminatory in nature.

Madison makes several important contributions to a discussion of exclusionary practices affecting recreational land. First, there is the idea that if land is impressed with the public trust, and the state is the trustee for the general public, it is then necessarily beyond the power of the lesser governmental body to alienate or limit use of the land. Thus, a beach cannot be alienated from the use of the public at large. Regulations cannot favor local interests. Secondly, recreational resources are protected by the public trust and are of state-wide importance which should effectively

label beaches as non-local resources. Finally, licensing which is basically the same as purchasing badges, parking stickers, etc., is not reasonably related to promoting public safety. Thus, a major argument of the beach municipalities is shaken.

The decision in City of Hartford v. Masley[55] is similar to that of Madison. The Hartford court ruled that "the control of public parks belongs primarily with the state. The authority which the common council or parks commision of a city may exercise in the control and management of public parks is not derived from the citizens of the municipality within the limits of which the parks are held, but from the legislature. The municipality, in controlling and managing such public parks act as governmental agencies exercising an authority delegated by the state and are always subject to state control."

The New York Supreme Court in Atlantic Beach Property Owner's Association v. Town of Hempstead[56] held that beaches and parks are matters of state-wide concern which transcend purely local interests. This opinion was again reinterated in Incorporated Village of Lloyd Harbor v. Town of Huntington.[57] In Huntington the main issues were whether a town had the authority to establish bathing beaches in a village within the town limits and whether bathing beaches are parks.

In 1955, Huntington acquired land in the villages of Lloyd Harbor and Huntington Bay for the purpose of operating public bathing beaches. The village had zoned these areas for more lucrative residential uses and questioned the constitutionality of a legislative act which expressly allowed the town to maintain beaches. The court established that the town did indeed possess this authority. The essential factor in the case, however, is that the court considered beaches to be public parks which further the public welfare.

The final case to be discussed in connection with the public trust doctrine is a famous New Jersey beach exclusion case Borough of Neptune City v. Borough of Avon-by-the-Sea.[58]

In this case, Avon controlled a municipal beach and instituted a differential fee schedule for residents and non-residents. Avon allowed residents to purchase $10 seasonal tickets, while non-residents paid $10 per month. The residents of Neptune City objected to these differential fees, charging they were discriminatory and filed suit. Avon argued that the differential fees were for the purpose of offsetting higher maintenance costs incurred by non-resident beach use. There was no dispute that the dry sand area was dedicated for public beach recreation uses, unlike earlier cases.

In its decision, the court interpreted the state authorization to the municipality to charge user fees as a delegation of the state public trust responsibilities. Avon had a duty to ensure that the public was allowed equal access to the beaches. The court struck down Avon's differential fee schedule, stating that while the legislature had authorized fees, it did not authorize discrimination by restricting sale of seasonal tickets to residents.

Avon expands the trust doctrine's definition of an obstruction to public use. Traditionally, under the public trust, physical obstructions are prohibited.[59] In Avon, it seems that impediments to the public's use of trust lands need no longer be physical barriers. The imposition of a differential fee is an impediment to free and equal use.[60]

The court also examines the nature of the state's authority to delegate its public trust powers to municipalities. Referring to Arnold v. Mundy,[61] the court argued that the legislature could indeed alienate public trust lands to private ownership. However, these lands continued to be subject to public trust rights of access even after

conveyance. The Avon court agreed with Arnold that even the state in its capacity as sovereign cannot obliterate the public trust. Certainly, a grantee of the state cannot, then, impair the common interests of state citizens in public trust lands through discriminatory actions. So, no individual or municipality can claim, nor can the government give him, a greater share of the benefits of the public trust than any other citizen can claim. Differential fees were struck down because they operated to give Avon's citizen's preferential access to the beaches.

It is significant that the court recognized that municipalities should be able to charge some use fees for maintenance of the beaches, although the charging of a fee may discriminate against low income families. Moreover, it should be able to turn people away from the beach in order to protect it from overuse, which destroys its recreational potential.

Equal Protection Clause

The final case to be discussed relies not on the common-law but upon application of the Fourteenth Amendment. The Fourteenth Amendment has been utilized mainly to fight racial discrimination, although it has been broadened recently in decisions relating to economic discrimination, residency requirements for welfare payments and the practice of law, etc.[62] In Brindley v. Lavallette, the equal protection clause was used to argue against non-resident exclusion from a municipal beach.

In the course of its development in case law, a formal means of analysis has evolved which the courts use to judge whether an infringement of the equal protection clause has occurred.[63]

This analysis, first asserted by the Warren Court, involves a two-level test. The first question considered is whether the challenged ordinance or classification of

an individual or group impairs a fundamental right or is naturally suspect. Second, if the first test is answered negatively, is there a rational basis for the classification chosen?[64]

The Supreme Court has considered cases involving residency restrictions; however, in each case some other fundamental right was affected.[65] In Shapiro v. Thompson[66] residency requirements in order to qualify for welfare payments were declared invalid because they inhibited interstate travel. The same argument could be made for beaches.

Most cases involving discriminatory ordinances attempt to show that the ordinance is arbitrary and unreasonable. Many of the justifications for non-resident restrictions advanced by municipalities can be tested using this measure. For example, municipalities argue that beach overcrowding is a serious problem and to alleviate this problem, non-residents should be excluded. Exclusion of non-residents is an arbitrary decision. Provision could be made to admit beach users on a first-come, first-served basis, as recommended in Avon. Another argument is that non-residents have unpleasant social and health habits, and therefore, should not be allowed to use the beach. This, too, is unreasonable in that it assumes a distinction in behavior characteristics stemming from place of residence. A final example is the argument that non-residents impose a great financial burden on a local community. However, this argument fails to consider that the local government has received state and federal funds, and that non-resident buying generates revenues for the city.

A court applying the equal protection test would quite probably find that residency requirements based on reasonings such as these are unreasonable in relation to the

problem they attempt to solve. This was the court's opinion in Brindley v. Lavallette.[67]

Brindley involved a suit by a property owner against the City of Lavallette to test the legality of an ordinance which established and regulated a paid bathing beach. The bulk of the decision examines the city's acquisition of a boardwalk easement by adverse use as the city claimed in its beach ordinance. The court upheld this claim; however, in the opening paragraph of the decision it declared the ordinance invalid because it discriminated against non-residents. This ruling was based on the equal protection clause of the Constitution. Quoting Morgan v. City of Orange, the court said: "distinctions between inhabitants based upon no grounds other than place of residence are a restraint on trade, invidious, unjust and illegal."[68]

In the above discussion of case law affecting public beach use, the courts have essentially acted as balancing points between private interests and public needs for recreation opportunities. Although there has not been an abundance of cases dealing with exclusionary practices in recreational areas, a general picture of the situation can be developed through an examination of the cases and a review of law journal articles. These sources suggest that, directly or indirectly, as a result of judicial decisions, the field of recreation planning and allocation is in a transition period from a localized concern toward more regional and statewide levels of concern. The current political system is unable to handle this transition and must rely on the courts in the interim. Indeed, whenever widespread "judicial scrutiny of specific governmental allocation decisions exists, it calls attention to the inadequacy of conventional public techniques for evaluating these resources involving diffuse public uses."[69]

The courts, then, are taking the first step toward counteracting beach exclusionary practices. They are paving the way for legislative action by explaining and expanding the scope of governmental powers in the field of recreation resources.

Through the application of a variety of common-law doctrines and constitutional arguments, the courts have articulated meaningful responses to the need for recognizing the seashore as a unique environmental and social resource in need of special protection and planning procedures. They have shown a willingness to remold and reinterpret traditional common-law concepts to answer rapidly changing social needs by expanding and revising some, such as the public trust doctrine, and narrowing others, such as presumption of the right to revoke a dedication to public use.[70]

As interim tools, these common-law and constitutional concepts have great potential to open restricted beaches for the enjoyment of the general public. There are, however, serious shortcomings to this case-by-case approach which demonstrates that the courts can only effectively guard the public interest on a short-term, temporary basis. There is a clear and pressing need for the state and federal legislatures to act decisively to permanently insure the public's right to recreational opportunities.

The basic difficulties with the judicial approach to solving these problems are three-fold. First, there is the problem of lack of uniformity which exists in the judicial system.[71] Judicial decision-making is subject to many uncertainties depending on the jurisdiction and the case. Thus, some courts may be very liberal in their interpretation, while others may take a more traditional approach. There are no definitive standards, even within states. For example, in June 1975, a judge in New Jersey refused to open a municipal beach ruling that the residents-only policy did not

cause irreparable damage to the public.[72] This decision is at the opposite end of the spectrum from the other New Jersey decisions of Avon and Brindley.

Secondly, unless a case is prosecuted, there can be no action to open beaches when specific state laws are non-existent. In other words, the public's rights in beach areas often has no statewide legislative guarantee and beaches must then be opened on a case-by-case basis. This process necessarily requires a group of activists who are willing to force the issue in court. A further difficulty is the problem of time needed to build up public awareness. As pointed out earlier, under some of the more traditional interpretations of the common-law, a private owner may permanently close off his upland beach if he acts within a given time span.

Finally, given the unique and vulnerable characteristics of the beach environment, which the courts have recognized, any type of wise allocation decision requires study of not only the social issues of beach use, but the environmental issues as well. The courts are essentially taking the place of a planning policy agency. It is not the purpose of the courts to conduct detailed environmental and land use studies in order to determine if indeed it is wise to throw open all beaches to unfettered public use. This is a problem of regional planning which requires multi-faceted analysis and policy formulation. It obviously calls for legislative action.

In summary, it can be concluded from the brief comments made above that access to beach recreation, as one aspect of the problem of coastal management, should be safeguarded by legislative action. The courts have shown the legislatures that they will support open beaches. The legislatures should now provide the courts with a clear policy statement to compliment the current common-law approach.

Footnotes

1. Baynard Webster, "Few Seaside Beaches Left Open to Public in Development Rush." New York Times, March 29, 1970, p. 54.

2. Thomas Agnello, "Non-Resident Restrictions on Municipally-Owned Beaches." 10 Columbia J. of Law and Soc. Probs. 177 at 177.

3. Richard Goldman, "Access to Public Municipal Beaches: The Formulation of a Comprehensive Legal Approach." 7 Suffolk Univ. L.R. 936 at 936.

4. Dennis Ducsik, Shoreline for the Public. (Cambridge: MIT Press, 1974), p. 69.

5. Roy Silver, "More Towns Are Closing Beach Areas to Outsiders." New York Times, July 4, 1970, p. 23.

6. John Darnton, "Suburbia's Exclusive Beaches." New York Times, June 2, 1974, p. 25.

7. Ibid.

8. Ibid.

9. New York Times, "Beach Ban Is Debated in Long Beach," July 25, 1971, p. 70.

10. Pub. Res. Code 27000 -- Cal. Stats.

11. H. R. 10394

12. Ducsik, p. 128.

13. 79 Yale L. J. 762, "The Public Trust in Tidal Areas," p. 764.

14. Goldman, p.

15. 68 NY 71.

16. Ibid. at 73

17. 41 US (16 Pet.) 367 (1842).

18. Illinois Central Railroad v. Illinois, 146 US 387 (1892); Allen v. Allen, 19 RI 114 (1895); Collins v. Gerhardt, 237 Mich. 38; Muench v. Public Services Commission, 261 Wis. 492.

19. Ore. Rev. Stats. 390.610-.770.

20. 47 Harvard L.R. 425 at 452.

21. Ducsik, p. 106.

22. Ibid.

23. 375 S.W. 2d 923 (1964).

24. 47 New York Univ., L.R. 369 at 370.

25. Steve McKeon, "Public Access to Beaches," 22 Stanford L.R. 564 at 573.

26. 47 New York Univ., L.R. 369 at 370.

27. 23 Am. Jur. 2d; Ded. ss. 372.

28. McKeon, p. 373.

29. 170 Cal 436, 150 P 62 (1915).

30. 2 Cal 3d 29, 84 Cal Rptr 162, 465 P 2d 50 (1971).

31. Ibid. at 38.

32. McKeon, p. 376.

33. 69 Misc. 2d 763 (1972).

34. Agnello, p. 217.

35. Black's Law Dictionary 461, 4th ed.; rev. 1968.

36. McKeon, p. 582.

37. 254 Ore 584, 462 P 2d 671 (1969).

38. 47 New York Univ., L.R. 369 at 380.

39. Ibid., at 385.

40. Ibid.

41. Bertram Frey, "The Public Trust Doctrine in Public Waterways," 7 Urban Law Ann. 219 at 220.

42. Martin v. Waddell, 41 US (16 Pet.) 367.

43. 47 New York Univ., L.R. 369 at 385.

44. Ducsik, 139.

45. Joseph Sax, "The Public Trust Doctrine in Natural Resource Law: Effects of Judicial Intervention," 68 Mich. L.R. 471 at 477.

46. Ibid., p. 560.

47. Ibid., p. 562.

48. Ibid., p. 563.

49. 146 US 387 (1892).

50. 79 Yale L.R. 762 at 788.

51. Agnello, p. 200.

52. Sax. 490.

53. 7 Wis. 2d 570, 97 N.W. 2d 513 (1959).

54. 96 N.W. 2d 585.

55. 76 Conn 599.

56. 3 NY 2d 434, 144 N.E. 2d 409, 165 NYS 2d 737.

57. 4 NY 2d 182, 149 N.E. 2d 851, 173 NYS 2d 553.

58. 61 NJ 296 (1972).

59. Mallon v. City of Long Beach, 44 Cal 2d 199, 282 P 2d 481; Wilbur v. Gallagher, 77 Wash 2d 306, 462 P 2d 232.

60. 26 Rutgers L.R. 179, "Note: Water Law -- Public Trust Doctrine Bars Discriminatory fees to Non-Residents for Use of Municipal Beaches." p. 183.

61. 6 NJL 1, Supreme Court (1821).

62. Agnello, p. 185.

63. Ibid.

64. Ibid, p. 186.

65. Ibid, p. 187.

66. 394 U.S. 618.

67. 33 N.J. Super 344, 110 A2d 157.

68. 50 NJL 389 at 391, 13 A 240.

69. Sax, 564.

70. Ducsik, p. 120.

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SALT MARSH MOSQUITO CONTROL

ITS ROLE IN COASTAL ZONE MANAGEMENT

by

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SALT MARSH MOSQUITO CONTROL: ITS ROLE IN COASTAL ZONE MANAGEMENT

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Introduction

Salt marshes are among the most biologically productive areas on the earth, the salt marsh grasses accounting for the bulk of the productivity. These grasses form the base of a detrital food web, with bacteria being the major decomposers. The bacteria are fed on by zooplankton, and these zooplankton are eaten by mollusks, crustaceans, insects and fish. This web continues, becoming more intricate at higher trophic levels and eventually including species of birds, mammals and more fish. Many components of this ecosystem are highly beneficial to man (e.g. fish, shrimp) and high productivity of these components is necessary to his survival. But high productivity of a few types of salt marsh organisms is not appreciated by man and may be detrimental to his health. Notable among these organisms are the mosquitoes, primarily Aedes, but also some Anopheles and Culex. These mosquitoes, with their capacity to transmit human diseases (primarily encephalitis) and to create a severe annoyance to man, can significantly affect other activities occurring within the coastal zone. The ideal to be strived for by the coastal zone manager is the attainment of mosquito control to levels tolerable and safe to man while at the same time maintaining the integrity of the salt marsh ecosystem.

Salt Marsh Mosquito Biology

A basic knowledge of the life cycle of mosquitoes is necessary in order to understand the control methods. The life cycle of all mosquitoes consists of four stages:

adult, egg, larvae and pupae. Only the adult is airborne and only the female bites. The eggs are laid either on water or in the mud, hatch into larvae in water, then emerge from the pupae as adults.

Mosquitoes of the genus Aedes (primarily Ae. sollicitans in NJ) generally form the bulk of the mosquito production from salt marshes, although other genera may be important. This genus is somewhat peculiar in that the eggs are only laid in the mud, they will not be laid on water, and the eggs must remain dry for 24 hrs after laying in order to be viable (Headlee, 1945). Then, once the mud is flooded, the eggs hatch and develop. Thus, the breeding requirements for Aedes are rather specialized: temporary ponds that are dry for some period of time (so that the eggs can be laid) and then are filled and remain filled for at least one week (so that the larvae can develop, pupate and emerge as adults.) Potholes on the upper tidal marsh (Spartina patens grasses) form the primary breeding grounds, as these are normally dry and become temporarily filled by abnormally high tides or rainstorms (Ferrigano, 1970). But with unusual tide or weather conditions mosquito production from other areas in the marsh may be important.

Mosquito Control Measures

There are three basic categories of mosquito control:

(1) Biological Control

(2) Source Reduction (Physical Control)

(3) Chemical Control

The only form of biological control (destruction of mosquito larvae by manipulating natural forces - W.H.O. 1973) presently practical is the use of mosquito-eating fish.

Other forms of biological control are being developed, including pathogenic controls (bacteria, viruses and protozoa), autocidal controls (radiation, chemosterility) and food-supply controls (limiting larval food supplies), but none are as yet operational.

A number of species of fish are known to eat mosquito larvae, but in salt marshes the principal ones are the killifish: Fundulus sp. (Headlee, 1945). These small fish are capable of surviving in very shallow water and penetrating into dense vegetation to seek out mosquito larvae. They occur naturally in most salt marsh areas forming one of the natural checks on mosquito populations. The simple addition of killifish to a salt marsh will have limited effects, as the fish probably already occupy the marsh to the extent possible in its present condition. The problem areas are the temporary ponds that are incapable of maintaining permanent fish populations, and cannot even be temporarily invaded by fish during certain tides (i.e. tides high enough to fill the ponds with water, but not high enough for the fish to enter). So the approach has in general been to physically alter the marsh so that the killifish can penetrate into previously inaccessible locations (see source reduction-mosquito ditching).

Source reduction involves the elimination of mosquito breeding environments. The temporary fish-free ponds are eliminated by making them (1) too short-lived for mosquito development, (2) permanent, or (3) accessible to fish,or by a combination of these three.

Mosquito ditching was one of the earliest and most extensively used methods. It involves digging shallow (30") narrow (10") ditches through areas of mosquito breeding, these ditches being connected to tidal channels (Headlee, 1945). Properly designed systems allow tidal circulation throughout the area, which tends to make the ponds too

temporary for mosquito development and also allows access of killifish to the pools. Permanent ponds should not be ditched to tidal channels, as these produce limited mosquitoes, and contain vegetation important to wildlife that will be destroyed if the ponds are drained at low tide. Often temporary pools will be connected to permanent pools by ditches, allowing the killifish in the permanent pools access to the temporary ponds. Occasionally the temporary ponds are so numerous that interconnecting them with ditches becomes impractical; in this case the ponds may be filled with ditch dredging spoil or may be integrated into a larger permanent pool stocked with killifish.

Mosquito ditching is now a dirty word among conservationists (so much so that mosquito associations refer to it now as Open Marsh Water Management-OMWM) because of its excessive and improper use in the initial mosquito control operations in the early 1900's. At that time extensive areas of non-mosquito breeding salt marsh were ditched, permanent ponds were drained and the ditching spoils were improperly distributed onto the marsh. These actions resulted in drastic irreparable damage to extensive salt marsh areas, with (1) the salt marsh being invaded by undesirable vegetation (Iva, Baccharis) species, (2) the waterfowl foods in permanent ponds being destroyed, and (3) mollusk, crustacean and other invertebrate populations being decimated (Bourn and Cottam, 1950).

But properly designed and properly implemented mosquito ditching can have apparently less adverse effects on the salt marsh. Vegetation changes can be kept to a minimum with properly disposed spoil (well distributed over the marsh rather than dumped in piles along the ditches), which in turn leads to fewer changes in fauna (although some changes still occur) (Ferrigano, 1970). However, ditching may not be appropriate in all mosquito breeding marshes as there is evidence to indicate that the greater the

tidal prism, the greater effect ditching has on the marsh vegetation. (Taylor, 1937).

Another problem with mosquito ditches is that as soon as they are dug the marsh begins to reclaim them, i.e., they require periodic maintenance. Headlee (1945) states that ditches require annual cleaning (a minor operation) with recutting every three years (a major operation). And if the ditches do become blocked, they are often ideal locations for mosquito breeding.

The other approach to source reduction involves flooding the marsh. This is accomplished by impounding the area and maintaining a relatively constant, high water level. One way tidal gates allow water to enter during the incoming tides, but prevent its escape with the outgoing tide. Pumping of water may be required at times to maintain the water level.

This action has generally the opposite effects from ditching, as the tidal influence is being removed rather than enhanced. The water intolerant vegetation species (Spartina patens) are eliminated and tolerant ones (S. alteniflora) enhanced (Mangold, 1962). If the water level is maintained high enough all the normal marsh vegetation will be destroyed. In essence, large permanent pools are created, and these, as mentioned previously, are very highly utilized by waterfowl and other water birds. On the other hand marsh organisms (including marsh birds) find their habitat destroyed. Extensive use of this method will drastically change the character of the marsh and may have severe repercussions on certain animal populations.

Chemical control-larvaciding

A wide spectrum of chemicals have been used as mosquito larvacides, but presently the number used in the United States is limited (Table 1). The majority in use in the

United States today are organophosphates, which are cholinesterase inhibitors that degrade rapidly. Chlorinated hydrocarbons (e.g. DDT) are used in foreign countries, but most are restricted in the U.S. as a result of their persistence and biological magnification.

There is no such thing as a 100% target specific pesticide; all are toxic to some other organisms (including man) to various degrees (Table 1). Unfortunately, there also appears to be an inverse relationship between the environmental safety of the insecticide and the cost. Pyrethrins, from an environmental standpoint appear near ideal, but their expense is such to prohibit their use in all but limited areas. Most of the organophosphates have some toxicity to birds, crustaceans, other insects (esp. bees), and fish (organisms that may depend heavily on salt marsh areas as breeding and nursery grounds), with the lower toxicity ones being more expensive. Parathion appears to have relatively minor effects on non-target organisms, but its high mammalian toxicity makes it a very touchy compound to work with. Also, the actual in-field effects of most of these compounds on non-target organisms have not been adequately assessed; so there may be false confidence in some of these materials.

As there is not (in general) continuous breeding on salt marshes, but event-induced breeding (high tides, heavy rains) a larvaciding program must include frequent inspections to determine the extent of breeding. Then areas where breeding is found can be sprayed. As salt marshes are generally inaccessible to boat or vehicle mounted sprayers, most spraying is done from the air. The use of helicopters allows both inspection and spraying to be done simultaneously, and also allows small sites to be treated accurately, as helicopters are maneuverable and can fly at extremely low altitudes. Airplanes are useful when large areas require treating, but usually result in unnecessary contamination,

as areas not requiring treatment cannot help but be sprayed in the process.

Larvacides are available in a number of different formulations, each designed for a particular mode of application. For salt marshes granular based larvacides are in general the best as they penetrate down into the vegetation and are least affected by wind, thereby decreasing the possibility of contaminating other areas. But they also tend to cost somewhat more. Liquid applications are very susceptible to winds and do not penetrate vegetation well, so should not in general be used.

Chemical control-adulticiding

The same or similar chemicals are used for adulticiding as for larvaciding (Table 1). Adulticiding is less frequently employed than larvaciding, and is primarily employed when larvaciding or other control has failed due to bad weather or improper implementation. Adulticides are usually not applied to the marsh, but instead to areas in and surrounding human habitation. Several factors make adulticiding less desirable than larvaciding: (1) it must be applied as a spray (granular formulations will not kill adult mosquitoes), increasing the likelihood of contamination by wind of adjacent areas not requiring spraying, (2) the chemical often comes into contact with man and his foods, (3) adult mosquitoes are less susceptibel to insecticides than larvae and higher rates of application may be necessary, and (4) the mosquitoes may have already had a chance to bite someone before they are killed.

Adulticides are applied by one of three methods: misting, fogging, or u.l.v. Misting involves spraying vegetation and areas where mosquitoes alight. Contact of the mosquito with the residual on the vegetation is sufficient to kill it. With fogging, a cloud of fine droplets of insecticide is produced, which lingers amongst the vegetation, killing mosquitoes on contact. Fogging is effective only when wind speeds are

Table 1: Pesticides Used in Mosquito Control

Larvacides * indicates also used as aduticide						
Name	Type	Human Toxicity		Effectiveness	Non-target Effects	Cost & Special Consideration
		Oral	Dermal			
Abate ® (temephos)	OP	extremely low	low	high	minimal to fish, birds & mammals, may kill crustaceans	safe for use in drinking water /high
Dursban ® * (chlorpyrifos)	OP	high	mod-high	high	may kill fish, bees, crustaceans	/mod-high
Baytex ® * (fenthion)	OP	high	high	high	may kill birds, bees, crustaceans	/mod-low
Malathion *	OP	low	low	low	may kill bees & fish	used primarily as adulticide
Parathion	OP	extremely high	extremely high	high	none reported	high toxicity demands,extreme caution in handling /low
Flit MLO (Mosquito Larvaciding Oil)	Oil	-	-	low	?	/high
Methoxychlor *	CH	-	-	?	may kill fish	relatively non persistent for chlorinated hydrocarbon /high
Pyrethrins *	Extract of Flowers	low	low	high	"safest insecticide on market"	use limited only by very high cost
Paris Green (copper acetoa-senite)		high	10w	low	?	must be ingested to act as poison; insoluble in water
Adulticides						
Baygon ® (propaxur)	OC					
Dibrom ® (dichloruos)	OP	high	mod			

OP - Organophosphate
CH - Chlorinated Hydrocarbon
OP - Organocarbamate

Table adapted primarily from
World Health Organization (1973) and
Cooper (1974)

less than three miles per hour, temperatures are above 65 degrees and mosquitoes are active. U.L.V. (ultra low volume) involves applications of highly concentrated insecticide at very low rates (e.g. 95% malathion @ 3 ounces/acre) in very small droplets. As with fogging. u.l.v. is only effective on contact, not as a residual, therefore it must be applied at a time when mosquitoes are highly active and when winds are low. U.L.V. is a relatively recent development, having the advantages that: (1) diluents (oils usually), sludge inhibitors, and mixing costs are eliminated, (2) there is no traffic hazard as associated with thermal fogs (ulv mists are essentially invisible) and (3) a small volume covers a large area (especially important for aircraft spraying as less reloading is required). There may be problems with these concentrated mists being inhaled by humans and causing respiratory problems (Lippman, 1973). Also improperly functioning systems may produce droplets which will mar painted surfaces (esp. automobiles).

Mosquito Control in Relation to Other Activities in the Coastal Zone

Aedes sp. (sollicitans in NJ), the principal salt marsh mosquitoes, unfortunately, do not remain in the salt marsh once they emerge. They migrate, so that 20-40 miles inland from a salt marsh, they may be prevalent (Headlee, 1945). Also, they tend to be active during the day as well as at night, with wind being the major factor affecting their activity. And on windy days they crawl up the legs of the victims until they encounter bare skin (Headlee, 1945). These mosquitoes tend to have among the more painful bites, and can be important in the transmission of encephalitis.

Most recreational activities (boating, swimming, fishing, picnicking and nature study) require that the area be relatively free of bite inflicting insects (MacDonald, 1959).

If insufficient mosquito control is practiced in an area, recreational development will not occur in this area; or if recreational development is already present in an area, a decrease in mosquito control will cause a decrease in the profitability of this enterprise. A decrease in recreational opportunities may lead to a decrease in residential and industrialsitings in the coastal area.

Outbreaks of encephalitis are still relatively common occurrences, even in the United States, with the most recent one being in 1975, in which 349 cases were confirmed with 41 fatalities. The majority of these cases were not related to salt marsh mosquitoes. But in 1959, 33 were seriously affected with encephalitis in New Jersey alone, and of these 21 died. The scare produced by this outbreak resulted in enormous decreases in shore visitors; the hotel industry in Atlantic City, NJ alone reporting a two million dollar loss (Bontempo, 1960). So, in addition to the human suffering caused by the disease, economic losses to recreational industries can also be enormous. With proper mosquito control the incidence of encephalitis should be minimized. It should also be mentioned that immunization against this disease has not as yet been possible, as there are a large number of strains of the disease.

Agriculture may also be adversely affected by inadequate mosquito control. The efficiency of pickers is greatly reduced if they have to contend with mosquitoes and their associated bites. Salt marsh haying (agriculture) increases the need for mosquito control, as portions of the marsh are diked to keep them dry and traversable by vehicles. During extremely high tides these areas become flooded and act as excellent breeding areas.

As most mosquito control methods have been shown to have some potential for harming fish and crustaceans, either through direct toxicity or by altering the habitat,

any effect on commercial fisheries and shell fisheries is likely to be negative. The existence or extent of effect will depend primarily on the type of mosquito control employed and its frequency of implementation. Insufficient information on the true effects of the pesticides and on the ecology of the organisms is available to be able to accurately assess the impact of any mosquito control program on fisheries.

A number of species of birds feed and breed in the salt marsh. The food organisms (mollusks, crustaceans) appear among the most likely to be affected by mosquito control practices (especially larvaciding) and a decrease in these organisms may be detrimental to certain bird populations. A few types of larvacides appear to have direct toxic effects on birds. In addition, birds (especially terns and skimmers) are easily displaced from their nests by intruders (especially noisy helicopters) making their eggs easy prey to other birds. Fortunately though, these species tend to breed in areas that remain dry throughout the season and do not require spraying. But helicopters nearby may disturb them.

Suggested Approach to Mosquito Control in CZM

Areas of the coastal zone with extensive salt marsh areas will have a mosquito control commission. In integrating mosquito control into a coastal zone management plan it is necessary to work with and through these organizations. The management plan should include some kind of provision for periodic evaluation of the control practices of the commission.

Several factors should be kept in mind when evaluating a control program. First, mosquito control commissions have a tendency to over-control. Second, mosquito commissions are restricted in what they can do by the landowner and by the federal government. Therefore, there may be better control measures available than they are

using. For example, the Fish and Wildlife Service may forbid ditching on their lands, while tolerating larvaciding, and in some cases the ditching may be more appropriate. On the other hand, commissions are generally within departments of public health and therefore often given sweeping powers.

To make an evaluation of a control program the following questions need to be answered.

(1) Is ditching a viable control method in this marsh? (Inspection of recently ditched areas should indicate whether drastic changes in vegetation will likely result). If it is, has it been used where necessary and there only (not as a general practice and not to drain permanent tidal pools)?

(2) Has impounding been used only in limited instances?

(3) Has chemical treatment been used only where and as often as there is need?

(4) Has larvacide been applied only to breeding sites?

(5) Has the most specific, least toxic and persistent pesticide been used (within cost considerations)?

(6) Have minimum rates of larvacide been applied?

(7) Has drift or drainage into unintended treatment areas been guarded against?

(8) Have areas of wildlife concentrations been avoided by spraying equipment? (Biologists at nearby refuges should have information on these areas).

The answers to these questions will be quite difficult to obtain, though the commissions records will provide considerable information, as will inspection of the commission in operation. The most difficult question to answer will be #3. In fact, the decision of whether to treat or not to treat is difficult for the mosquito commission to make. Sites that show breeding may or may not produce adults depending

on the weather, tides and wind (e.g., warm dry weather may cause the ponds to dry out before adults emerge). Therefore, the decision to treat may have to be based on sometimes inaccurate weather forecasts. Mosquito commissions may have the tendency to treat any site where breeding is found. This is understandable and perhaps unavoidable, especially when large areas of salt marsh must be covered, for there simply may not be sufficient time and equipment available to come back several days after the initial inspection and see whether the larvae are still present. An additional factor in this question is: what constitutes sufficient breeding to necessitate treatment? A universally satisfactory answer to this question does not exist.

Although the answers to these questions may be difficult to track down, at least in the process of trying to answer them, gross mismanagement on the part of the mosquito commission may be uncovered. If deficiences are uncovered they may be dealt with, and if not and an 'adequate' (yet to be defined) level of control is being maintained, it can be assummed that the mosquito commission is doing a reasonable job. But it will be necessary to reevaluate the role of the mosquito commission frequently as personnel, pesticides, and control methods change and information on the side effects of control methods increases. As states and localities enact environmental review legislation, this activity should come under the environmental assessment or impact analysis procedure.

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A VITAL COASTAL AREA:

The Seagrass System

by

Elizabeth Johnson

A VITAL COASTAL AREA:
The Seagrass System

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Introduction

Historically, the coastal waters of the United States played a major role in its economic growth and development (Odum, et al., 1974). Our increasing population, supported by an ever-growing economy, continues to exploit and depend upon coastal zone resources, resulting in rapid and noticeable deterioration in some heavily used areas. A cry for description and management of coastal systems was answered by environmental and water quality legislation in the form of several acts. A major piece of national land use legislation, the Coastal Zone Management Act, was accepted in 1972, with objectives being protection, preservation and rational use of our nation's coastline (Gardner, pers. comm., 1977). Federal support for initiation of state programs provided the needed incentive for critical evaluation of coastal zone issues and problems. A different coastal zone perspective was supposedly taken: a view of the land from the water.

The bulk of literature on coastal ecosystems is immense, yet most papers avoid discussion of interrelationships and dependencies between coastal systems and concentrate more on increasing the data base for small, unique pieces within the system. Odum, et. al. (1974) attempted to create a functional classification of coastal ecosystems comprised of natural systems as well as induced systems associated with man's intervention. The list is comprehensive and provides a survey of the scientific literature, but the authors indicate the true complexities of the systems as a whole in their general recommendations section.

To most of us, the natural ecosystems are familiar, or we at least have some idea of the value of the system. Mangroves, wetlands and coral reefs are usually associated with thoughts for preservation and protection, and some areas of this sort are already set aside by the National Park Service. Perhaps one of the least familiar, though an equally important system is the seagrass ecosystem.

The Seagrass System

Seagrasses are aquatic angiosperms that are completely adapted to life in the marine environment. According to Arber (1920) and den Hartog (1967; 1970) they need the following faculties to be able to colonize the sea successfully: 1) ability to live in a saline medium, 2) ability to function normally when fully submerged, 3) a well-developed anchoring system, 4) ability to complete the generative cycle when fully submerged, and 5) ability to compete with other organisms under more or less stable conditions of the marine environment. The number of species which have these properties is extremely small, nine occur in the U.S. (including Puerto Rico and the Virgin Islands). The nomenclature is as follows:

order	family	species	common name
HELOBIAE (monocotyledon)	Potamogetonaceae	Zostera marina L.	eelgrass
		Phyllospadix (2 spp.)	
		Ruppia maritima L.	widgeon-grass
		Syringodium filiforme Kutz	manatee grass
		Halodule (2 spp.	shoal grass
	Hydrocharitacea	Halophila decipiens Aschers	
		Thalassia testudinum Konig	turtle grass

(after Reimold and Queen, 1974)

The number of seagrass species is by no means proportional to their ecological importance. The seagrasses usually occur in enormous quantities and form dense meadows which cover vast areas in both temperate and tropical coastal waters.

In north temperate regions, Zostera is the single most important seagrass. Phyllospadix species inhabit exposed, rocky shores along the northern Pacific (Phillips, in Odum, 1974). Syringodium,Halodule, and Thalassia are largely Caribbean, although Syringodium and Thalassia inhabit coastal waters of the Gulf of Mexico, and Syringodium and Halodule are reported from Bermuda waters (den Hartog, 1970). Halophila inhabits deep waters, or shallow, silty waters where other species cannot survive. Ruppia inhabits shallow, brackish waters and is reported from freshwater in temperate regions (Phillips, in Odum, 1974), but may also be found in tropical salt ponds and bays. This species forms a system of its own because it is tolerant to a wide range of salinities.

Seagrass forms a conspicuous shore community, yet its true importance to marine coastal ecosystems is not fully understood and is therefore generally underestimated, if not totally ignored. Marine meadows function much like the very conspicuous, well-known shore communities considered for protection and preservation.

The productivity of the sea has a low, rather uniform pattern of primary production plus a few areas of extremely high production. Examples of highly productive areas are: upwelling regions on the continental shelf; shallow,protected coastal bays; salt marshes; mangrove forests; and seagrass meadows (Odum, et. al., 1974). These high production areas serve as primary sites for biological fixation of carbon that is distributed to the remainder of the ocean area through advective processes and food webs. A high productivity implies a high nutrient demand as well as dynamic cycling of trace metals and compounds involved in plant growth. In seagrasses, the physiological mechanisms involved in elemental supply and cycling are not defined, although they may absorb compounds in the sediments through roots (Zieman, 1972). In this light, seagrasses become a system

for returning nutrients and other compounds to the water that are uselessly trapped in marine sediments elsewhere. Standing stock (biomass) and productivity (gC/m^2 day) of seagrasses rank with the highest standing stock of tropical rain forests, and highest productivities of such terrestrial crops as Zea mays (Westlake, 1963), or productivity associated with the phytoplankton community of marine upwelling regions (Ryther, 1969). These data establish seagrasses as one of the most productive ecosystems on land or the sea, and measurements do not include the productivities of seagrass-associated flora discussed later.

Productivity and assimilation of compounds from sediments and sea water are only two of several assets of a seagrass community. Functional assets of the community are many. Although seagrass produces a large quantity of organic material alone, it also offers a good substrate for plant and animal epibiota. The epiphytic community on a seagrass blade contributes to primary productivity, as previously mentioned, but the associated epifauna provide a protein source for secondary seagrass consumers. Relatively few consumer species are known to use seagrass tissues directly. Brant goose feeds on Zostera, and in tropical seas, manatees, sea turtles and some fishes digest seagrass. Sea urchins and some fish species, however, seem to better utilize seagrass epiphytes and epifauna (Bertran and Bertran, 1968; Randall, 1965; Ranwell and Downing, 1959). None of these grazers appear to have any great impact on production; thus, a large part of seagrass production must enter the detritus food chain. Dexter (in Odum et al., 1974) states that detritus is probably the most important single item at the base of food chains in intertidal and shallow sublittoral communities. Thus, although seagrasses are seldom used directly, they have an important indirect part as a food resource.

Seagrasses (excluding Phyllospadix) also function in stabilization of shifting bottom sediments through a baffle effect. Small organic and inorganic materials are deposited and held in place by the well-developed root and rhizome system. As seagrasses grow, greater amounts of particles are trapped and sediment depth increases. The relatively stable sediments offer shelter for a diverse infauna, including some economically important shrimp and fish species. Seagrass beds also act as nurseries for fishes and other organisms which spend only a portion of their life cycle in shallow waters (den Hartog, 1967).

Succession in seagrass communities generally moves toward higher biomass, productivity and organization. Zostera forms the simplest community; the pioneer stage is the same as the climax. Phyllospadix can maintain itself only where it is unsuitable for development of giant kelp beds. Tropical succession is more complex and less understood, although it is generall agreed that Thalassia is the climax species. Succession within the seagrass community is under debate, but even more questionable are speculations on seagrass community position within coastal zone succession as a whole. Seagrass succession to salt marsh or mangrove communities has been suggested in the literature (Chapman, 1944), but there is little evidence, as yet, for such a progression (Zieman, 1972). More study is needed to clarify successional sequences in seagrasses.

Effects of Disturbance

Phillips (in Odum et al., 1974) discusses literature on the effects of various disturbances on seagrass systems. Some researchers report the disappearance of Zostera following dredging. A rapid decline would be expected as seagrass meadows are sensitive to heavy silting which blocks photosynthetic surfaces. Crude oil spillage, as well as other chemical

pollution is responsible for some Zostera and Thalassia bed reduction. Seagrass periodicity is partially regulated by environmental factors (salinity, light, temperature) so that great care must be taken in disposal of industrial effluent, including thermal discharge from nuclear reactors as well as brine evaporation runoff. Careless treatment of marine soils may render them unfit for colonization by seagrasses. The effects of disturbance are not always adverse, however; the consequences of change in the shallow sea waters may vary from site to site. Dredging, for example, may completely destroy seagrass beds in one area while enhancing growth and succession in another (Odum, 1963).

Natural disturbances, such as hurricanes, can have adverse effects on seagrass systems (Thomas, et. al., 1961). The least understood, yet most devestating effect of 'natural' disturbance was evident during the 1930's when a massive reduction (worldwide) of Zostera beds occurred from an unknown phenomena called 'wasting disease' (Clark, 1976). Phillips (in Odum et al. 1974) states that many papers cited the reduction of some marine life and an overall change in fauna after Zostera disappearance. Since the 1930's Zostera is coming back to recolonize destroyed areas.

It is clear that little is known about the effects of disturbance, whether natural or unnatural, in seagrass systems. The natural succession within these systems is barely described and even less understood. We are not able to control natural disturbances, yet, because we do not understand natural disturbance processes. However, we can prevent excess man-made or unnatural disturbance to the system through control of coastal zone development.

Seagrass beds are a problem only to man. Since the 1930's, man's activities in the coastal zone have increased tremendously. In temperate regions, Zostera has been

increasing in abundance since its decline from wasting disease; it is becoming more noticeable. Smith, et.al. (1970) working on Long Island, New York, evaluated the Zostera 'problem'. It was ranked with other marine resource problems such as; wastewater disposal, wetland destruction, pollution, etc. Complaints from boat enthusiasts and landowners describe Zostera production as a problem for propellors and Zostera detritus as "unsightly". Proponents of Zostera proclaim its importance, but since "no major, practical, economic use" has been developed and its ecological importance is not direct, the majority ruled for control of Zostera. Control measures include collection of large floating detritus and mechanical control or destruction of rooted Zostera in marinas and harbors. Chemical control has also been suggested. In the light of the previous discussion on the functional aspects of seagrass communities, these types of control will most likely affect more than just the target species. Uprooting of plants may cause a change in fauna and even a massive shifting of bottom sediments. Removal of detritus destroys the important Zostera link in detrital food webs. The overall effects, or indirect effects, may include a decline in sport-fishing, perhaps the very reason that boat enthusiasts are on the water.

In contrast to the above situation, Clark and Sarokwash (1974) working in Rookery Bay, Florida, evaluate grass beds with the same concerns given to mangrove communities. They state:

> "Reduction of mangrove forests is particularly serious. Mangroves convert minerals to leaf detritus and any loss of them results in an adverse loss of nourishment to the majority of species of animal life and undermines the whole system of life support in the estuary . . . . Loss of seagrass beds is similarly adverse."

The Rookery Bay Land Use Studies are unique, indeed, but if this is the type of study needed to protect vital areas from destruction, it should be done.

Conclusion

If we are, indeed, viewing the land from the water, it appears the we have not gone far enough to sea. Seagrass beds, because they are completely submerged have been ignored, especially in temperate zones. The need for increased knowledge and understanding of total coastal zone processes and their interrelationships is evident. It seems that we are constantly restoring those areas already destroyed--after we have discovered their importance, rather than protecting those areas yet undisturbed. Comprehensive planning in the coastal zone will eliminate many of the problems ahead in the future regarding coastal zone use. Seagrasses may prove to be a useful community directly, but more research is needed. Because they have so many functions in the coastal zone, they may be used for restoration in some areas. In speculation, I can foresee seagrass functioning in stabilization of dredging spoils, or perhaps a certain clone of seagrass may be planted which will survive unnatural disturbances such as thermal pollution or heavy silting from coastal development. Before such a system can be utilized we must understand the workings of the natural systems. We must draw attention to all portions of the coastal zone, without slighting those we know little about.

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TERN RESTORATION AND MANAGEMENT PROGRAMS ON THE ATLANTIC COAST

by

Tina Milburn

TERN RESTORATION AND MANAGEMENT PROGRAMS ON THE ATLANTIC COAST

Tina Milburn

Introduction

In the 19th century the coastal zone of the U.S. was primarily important for commercial reasons and for the whaling and fishing industries. Since then many more uses of coastal resources have been discovered and exploited in some way. The need for energy has led to the development of offshore oil and nuclear power plants. The increase in population has created a need for sites for waste disposal and has led to recreational use of coastal waters such as boating, beach activity, and real estate development. The problems that arose from the heavy unregulated use of a limited resource has been seen in the whaling and fishing industry where growth in demand has surpassed the growth of the resource. It is not easy to quantify the use of consumable species such as fishing but it can be done; and the effect of man on the species' survival can be predicted within certain limitations. What is much more difficult is for man to judge his effect on a resource with which he is only indirectly coming into contact. An example is the problem of non-game wildlife, trying to survive in the face of a tremendous growth of human population and trying to cope with the ensuing competition which results when humans utilize the same habitat. Obviously the coastal zone is only one of many habitats in which man and wildlife conflict, but it is an excellent example of the problems that can be created by a rapid growth in the population of one species in an area in which many others must coexist. The question soon becomes which species will "win". Even when it is detrimental to humans to eradicate another species, lack of management and foresight can still allow this to happen. However, the number of people who can see the value of species other

than those they can exploit seems to be gradually increasing.

Many of the problems caused by conflicts between man and wildlife occur when the latter threatens man's survival. Examples are coyotes and sheep ranchers, blackbirds and corn farmers, grizzly bears and campers, wolves and townspeople. But an even more serious problem which is less visible and thus harder to combat, is man's destruction of natural habitats because of his expanding population. Many of the most popular species (such as whooping cranes, California condors and bald eagles) are suffering from this growth; in addition there are also some species which are less visible and thus less familiar to man. Many of these animals are found in the coastal zone where a good part of their lives are spent on offshore islands or even far out at sea. Because man does not see them very often and does not need them for food or clothing, he tends to overlook the effect his actions are having on their existence. As he changes the condition of the coastal zone through development of natural areas, increased boat traffic in coastal waters, unrestricted use of beaches, dumping of waste products, pollution, etc., he is also altering the ecological niches to which these species have evolved.

The purpose of this paper is to examine the effect that use and growth of the coastal zone have had on a specific group of colonial water birds: terns. Terns, although unique in certain ways from other wildlife in coastal areas, share many of the same problems. They can be viewed in microcosm as indicators of the problems faced by wildlife trying to adapt to a changing ecosystem. The questions I hope to explore are whether man and wildlife can coexist in the coastal zone and still satisfy their individual economic and ecological requirements, and whether each can adapt to the needs of the other to bring this about. Terns are the example chosen here because of the serious problems in population decline they are facing right now, and because they serve as excellent reflectors

of man's ability to appreciate a species of no commercial value and yet which can be of tremendous use in teaching him how to cope with a fragile ecosystem.

There are 16 species of terns, a group of waterbirds closely related to gulls and shorebirds. They inhabit the Atlantic coast from Florida to Maine and the Pacific coast from Alaska to Southern California. Although a few species of terns live on freshwater marshes or lakes, most live in coastal areas -- in salt marshes, along shoreline beaches or on offshore islands. For the purposes of this paper, I am confining my discussion to those species of terns living along the Atlantic coast. Since the breeding biology of each species is different, some species have been more adversely affected by coastal zone problems than others; I plan to focus on the ones having particular difficulty in adjusting or whose habitat has been most threatened.*

Causes of Decline

Background:

In the 1880's and 1890's terns, herons and other seabirds which nested colonially were almost eradicated by plume hunters working for the millinery industry. Fortunately, the public was made aware of this slaughter before it was too late by the National Audubon Society. Protective measures were taken to prevent such large-scale extermination with the result that the birds made a comeback and reclaimed much of their former territory in the 1930's. However, in the late 1960's panic struck again when the Massachusetts Audubon Society noticed that common tern populations off the Massachusetts coast were declining

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* This includes Common Terns (Sterna hirundo), least (S. albifrons), Arctic, (S. paradisaea), Forsters (S. forsteri), Roseate (S. dougallii), Royal (Thalasseus maximus), Sandwich (T. sandvicensis), Caspian (Hydroprogne caspia).

at an alarming rate. Several causes such as pollution and disease were explored and ruled out. (Buckley 1976). It became evident that not one, but rather a combination of factors, was causing the terns' decline. Many concerned people ranging from ornithologists to housewives to the National Park Service and Fish and Wildlife Service looked into the situation, coming up with some answers and solutions and raising many more questions.

The decline of the terns was not limited to Massachusetts but was occurring along the entire length of the Atlantic coast involving not only common terns but Arctic, roseate, royal and least terns as well (Fisk 1975). Several characteristics of the declining colonies were observed. The birds were showing shifts in habitat preference, nesting on artificial structures such as roof-tops, dredge-spoil islands and man-made impoundments instead of on natural nest sites. Species which normally nest on sandy beaches were seen nesting in salt marshes. Tern colonies were becoming larger and less numerous which meant increased vulnerability to single disturbances (Buckley 1976).

It has become obvious that the causes of the terns' decline not only varies from species to species but also from region to region along the coast. Each area has specific coastal problems that affect the terns, but the breeding biology of the terns is also a major factor in explaining why they can adapt well to some changes in their resting habitat and adapt poorly to others. Although the purpose of this paper is not to discuss tern life history, some knowledge of the birds' behavior is essential for an understanding of their population decline.

Breeding Behavior:

Terns are ground-nesters which makes them particularly susceptible to predation. Because of this their optimal nesting habitat is on islands where they can avoid mammalian predators. All the anti-predator adaptations they have evolved are directed against avian

predators: their eggs are cryptically colored to blend in with the substrate, the nests are spaced a good distance apart to make them more difficult to see from the air, a few species remove eggshells from the nest since the white lining of the shell is easy to spot, and in some species the adults abandon the nest at night and return in the morning so that they can seek shelter from owls which might attach them on the nest. None of these adaptations would work for mammalian predators like raccoons, foxes, and rats which hunt at night and locate the eggs and young by smell and not by sight (Howard 1968; Nisbet 1975). The problem with the terns' evolution of adaptations for an island existence is that islands are also the sites of intense recreational activity by boaters, fishermen and vacationers. When the terns are forced to move to the mainland due to excess disturbance, they are very vulnerable to mammalian predators which can ravage an entire colony.

Terns return to traditional nesting grounds year after year but will abandon them readily if disturbed. Because they choose to nest on sites which are subject to a good deal of physiographic change (such as beaches, dunes and marshes), they have evolved an ability to move around and renest. However, since World War II, the demand for waterfront real estate has caused a great increase of activity along the coast. The terns' problem now is that there are fewer and fewer sites on which they can renest (Howard 1968).

Because terns are colonial, they face the problem of extreme vulnerability to the elements. One climatic disaster can wipe out an entire colony of thousands of birds and thus severely threaten the species as a whole.

Each species of terns has specific nest site requirements which sometimes reflect the survival potential of that species. For example, least terns have been having trouble along the Atlantic coast from Maine to Florida and are presently considered endangered

in California. This decline is mainly resulting from their nest-site preference for open sandy beaches. The availability of such beaches is inversely proportional to the human population in those areas. Therefore one can understand why California's least tern are having so much trouble reproducing. Recreational activity is extremely high on sandy beaches and the peak of such activity occurs right after the terns have begun to nest. When the terns move into an area to build their nests in the spring, the beaches are relatively quiet and undisturbed. However, once the eggs are laid and the adults tied into the nest site, children are let out of school and the beaches are used for dog walking, swimming, boating and other activities which often contribute to nesting failure.

Other species of terns such as commons and roseates nest further back on the more covered dunes so their problems are slightly different than the leasts. Dune stabilization projects change the physiography of the dunes which often hurt the nest sites (Oberheu 1974).

Competition from Gulls:

Although closely related, gulls and terns differ considerably in their ability to adapt to a changing ecosystem. Like terns, gulls were also hunted for their plumes and eggs and were threatened with extinction. However, when the hunting ended, the gulls made a dramatic comeback. This was mainly due to the increase of garbage and sewage disposal from the expanding cities along the northeastern coast; this created an ecological niche which was filled by the scavenging gulls. Gulls began expanding their territories southward from Maine and were soon in direct competition with terns for breeding grounds (Howard 1968). It was once believed that the gulls chase the terns off the nests; however, it is more likely that because gulls are earlier nesters, they simply

occupy all the optimal nest sites before the terns arrive (Drury 1965). Since most of these nest sites are on isolated offshore islands, the terns are forced to nest on inshore islands, which are more accessible to boats and thus more disturbed by humans, or on the mainland itself where mammalian predation is very high (Nisbet 1973 a).

Food Availability:

Overfishing has been a chronic problem along the coast both economically and ecologically (Nisbet 1973 b). Terns unlike gulls, are not scavengers but instead only eat live fish. Most fish-eating birds regurgitate their meal to their young, a practice which enables them to bring back a lot of food at once to the nest thereby giving them the opportunity to travel long distances to find food. Terns, however, feed their young food carried in their bills, normally small herring, and therefore can only provide a little food at a time. Since the young have to be fed often, the adults are not able to travel long distances to look for food but are dependent on fish supplies within 5 miles of the nest sites (Howard 1968; Fisk 1974). (Gulls have been known to travel 25 miles for food by comparison.) (Drury 1965) The adult terns are also required to look for food constantly even when the water is choppy and the fish hard to find. This means the nest is abandoned much of the time leaving the young vulnerable to predator attacks by gulls, herons,etc. Dr. Ian Nisbet of the Massachusetts Audubon Society (1972) investigated the drastic decline of common terns off the Massachusetts coast, looking at disease, pollution, predation and direct disturbances as possible causes. His conclusion was that the terns were unable to find enough food to feed their young and therefore, although they were able to nest and lay eggs, few young were surviving.

Coastal Zone Activities and the Effects on Terns

Until now the human activities described have had negative effects on terns. However, there are positive ways in which man, albeit unknowingly, has been helping tern populations. Nesting surveys along the east coast have shown that few tern colonies are actually still using natural beaches but are instead resorting to artificial nest sites (Downing, unpub.). The major locations of such artificial sites are on dredge spoil islands. The terns have turned to these in preference to natural sites probably because of the decrease in disturbance. On Fire Island, Long Island, 50% of tern nests were on dredge islands while the other 50% was concentrated on one natural site. At Cape Hatteras National Seashore, 95% of the tern nests are on artificial islands. It is not surprising therefore that the Division of Wildlife Refuges of the Department of the Interior organized a meeting in 1974 in North Carolina to discuss the management of dredge spoil islands. The political problems of such a management effort revolve around the fact that most of the islands are state-owned. North Carolina, for example, has been following a policy of having a few large islands while several smaller islands would be better for the terns (Oberheu 1974). Another example of the results of the states' lack of management is in Florida where 1,000 least tern nests were covered over by new dredging spoil.

The problem of food availability has already been discussed. However, there are more indirect causes to the problem than simply overfishing of the waters near the nest sites. Filling in of salt marshes and wetlands for airport runways and commercial or industrial development result in a destruction of nurseries for many of the fish species on which the terns are dependent (Nisbet 1973 b). Increased boat traffic in inshore areas and along the coast create disturbances of fish schools requiring the terns to spend more time looking for food.

One of the biggest problems affecting wildlife on beaches and shorelines is off the road vehicles. One of these can decimate an entire tern colony during one drive down the beach. I observed an example of this first hand on Cumberland Island off the coast of Georgia. The National Park Service took over part of the island in the early 1970's and made it into a national seashore, leaving the rest under private ownership of one of the original owners. There is a least tern colony on the islands' extensive sandy beach. While there, I observed several trucks and jeeps travelling up and down the beach but saw signs prohibiting vehicle traffic on the dunes. The NPS had made a deal with the private owners when they bought the land which gave the federal government the right to protect the dunes but not the beach. The tern colony has been seriously affected by these vehicles as have the loggerhead turtles which come up on the beach in the spring to lay eggs. Vehicle traffic is also a major problem on the Cape Hatteras National Seashore (Downing unpub.).

Each area has its own set of coastal activities which affect the terns. In New Jersey natural nest sites are being disturbed by real estate development. In Florida the increase of development along the coast has forced least terns to establish colonies on flat rooftops (Fisk, unpub.). A study done in northeastern Florida showed that least terns nesting in natural habitats had a 9% success rate compared to the 77% rate of these nesting on rooftops (Fisk 1975).

When trying to manage coastal zone activities, we cannot simply look towards the protection of natural habitats as our only end because in certain areas earmarked for real estate development, offshore oil drilling or industrial and commercial use, this will lead to bitter and pointless conflicts between the developers and environmentalists.

Instead we must also look towards replacements of the natural habitats we have already damaged. Terns are just one example of a species of wildlife that can adapt to artificial nest sites if the sites are managed with that purpose in mind. If we have to destroy habitat, and this should be avoided at all costs, we must replace it with an equally workable artificial substitute.

Management Programs

Terns have captured the interest of scientists, government officials and people who live near the coast. Perhaps this is because of the birds' aesthetic charm, or perhaps because they are indicators of the ecological integrity of our coastal zone. As a result of this interest, there have been steps taken to prevent a further decline in tern populations. The important role the Massachusetts Audubon Society played in calling attention to the problem in the early 1960's led to much of the research that has been done on the causes of the tern's decline and recommendations for halting it. Massachusetts Audubon's tern work began in 1960 when the problem of gulls nesting in tern habitat was first discovered. A management program was started in 1966 on Plymouth Beach, a sand peninsula on the Massachusetts coast. Four different species of terns were nesting at the tip of the peninsula. Massachusetts Audubon fenced off the colonies and eradicated the rat population which was preying heavily on the eggs and young (Howard 1974). The protection program was soon extended to the rest of the Cape Cod National Seashore. Colonies were posted, leaflets were passed out to educate the public about why the terns should not be disturbed, and tern wardens were appointed to protect the nest sites during the critical period of incubation and raising the young. The problem of human disturbance was eased tremendously. The result was an increase in least terns, the species most vulnerable to such disturbance, but a drastic decline in all the other species. 1972 was

an especially bad year for tern production. Food availability was thought to be a determining factor on some of the sites (Nisbet 1972). On others the increased size of the colonies and decreased distribution may have made the chicks more vulnerable to predation. Hurricane "Agnes" also destroyed many of the nest sites that year; natural disasters such as storms wreak more havoc on densely clumped colonies than smaller more scattered ones (Nisbet 1973 c).

Nathaniel Reed, Assistant Secretary of Fish, Wildlife and Parks of the Department of the Interior, became concerned about the problems of terns, herons and other waterbirds. He ordered the National Park Service to draw up guidelines for the protection and management of these birds in refuges and parks (Buckley 1976). In 1973 the National Park Service joined Massachusetts Audubon and began tern protection programs along the national seashores. A Cape Cod program was established in which the National Park Service protected the federal land, and Massachusetts Audubon protected the public and private lands. A scientific research project in tern behavior and breeding success was undertaken by Dr. Ian Nisbet of Massachusetts Audubon. Mrs. Erma Fisk, a tern warden on Cape Cod, began to do nesting surveys on least terns from Key West, Florida to Popham Beach, Maine (Fisk 1974, 1975). The results of these surveys were sent to the Department of the Interior along with Mrs. Fisk's recommendations for better least tern management. The tern colonies on Cape Hatteras National Seashore were studied by Paul Buckley (1973) of the National Park Service's regional office in Boston. At the end of 1975 a meeting was held jointly by Massachusetts Audubon and the National Park Service to set up programs for tern management and to exchange information. The effort culminated in a report prepared by Buckley in 1976 drawing up guidelines and recommendations for colonial waterbird management. The report outlined the natural causes of decline (storms,

predation, tides) and the human caused disturbances and their effects (off the road vehicles, dog walking, vandals, mosquito control,etc.). Recommendations were made for methods to prevent such disturbances (fencing, education, posting, tern wardens, etc.) and for habitat management of beaches, dredge spoil islands, man-made impoundments, salt marshes, and streams and rivers.

As mentioned previously, in 1974 a meeting was held in North Carolina on the management of dredge spoil islands. This arose from the reports by Buckley and others in the National Park Service which emphasized the importance of these islands for breeding terns. The meeting called for an inter-agency approach to colonial bird-nesting along the coast and a thorough survey to be made of colony productivity (Oberheu 1974).

Conclusion and Recommendations

The interest in tern management is encouraging; however, the problem is not going to be easy to solve. As mentioned earlier each species and each region has its own problems in the coastal zone; therefore general management schemes applied across the board may not be the best solution. Control of disturbance along beaches and management of artificial nesting sites such as dredge spoil islands, man-made impoundments and rooftops is crucial to the future of least terns and the implementation of such measures is the main reason why least terns have been increasing along the east coast while most of the other species have been declining. The problem is that habitat, although definitely a problem for the other species, is not the only problem. Food availability seems to also be an important determinant of reproductive success. The long term effects of organochlorine pesticides and other pollutants have not been closely examined although they are known to seriously affect other fish-eating birds like brown pelicans, ospreys and bald eagles. Industrial, commercial and residential real estate development often occurs on waterfront

locations, thereby taking over much of the terns' potential natural habitat. Draining of salt marshes, dredging of estuaries and rivers, and filling in of lakes and swamps all take their toll on the fish populations dependent on these areas for spawning and raising their young. Waterbirds such as terns suffer the consequences when they can no longer find enough fish for themselves and their offspring.

It is not man-made activities alone that threaten the terns' existence. Storms, blowing sand, predators and high tides all must be dealt with. However, if the birds have to combat both natural and man-made disasters, they are being forced to face unbeatable odds.

Any management plan has to take all these difficulties into account. Dredge spoil islands and man-made impoundments should be managed so as to meet the habitat requirements of each species -- for example, open sandy sites for terns, a little more cover for commons and dense cover for roseates are necessary. Strict control of human traffic near tern colonies must be maintained. Massachusetts has set the example for how this can be organized on a state level and other states should follow suit. State cooperation is of primary importance since many of the nesting sites are on state-owned dredge islands or state-controlled beaches. The NPS has made an effort to manage human activity on national seashores, but their authority in other areas is dependent on the will of the states (Oberheu 1974). Public education is extremely important when trying to protect a little known group of birds like terns; the birds' breeding behavior, tolerance for disturbance and overall survival struggle must be delineated so that people not only understand what they are protecting but also so that they appreciate the birds and want to protect them.

The more difficult problems to control are those factors affecting the terns' food supply. In this case terns are not the only wildlife being hurt by increased development. The quality of our coastal zone is threatening to decline for all species including humans unless the proper management procedures are undertaken. Terns can be seen as indicators of that quality and their future as a challenge to preserve it. This does not mean that to have terns we have to stop all development. As has been seen, there are many ways man can improve tern habitat and at the same time gain a benefit for himself. The adaptibility of terns to artificial nest sites may turn out to be the characteristic that saves them. In the same way that offshore oil rigs can provide artificial reefs for fish, coastal activities, if managed with the future of wildlife in mind, need not always be in direct conflict with the natural ecosystem. At least, if we take away from another species during our coexistence and utilization of the same coastal habitat, we should concentrate on giving back that species' requirements for survival.

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